FURUNO®

Installation Manual

MARINE RADAR FR-2115-B/FR-2125-B

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SAFETY INSTRUCTIONS

WARNING

Radio Frequency Radiation Hazard

The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance.

Distances at which RF radiation levels of 100 and 10 W/m^2 exist are given in the table below.

Note: If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible - ask your FURUNO representative or dealer to provide this feature.

Model	Radiator type	Distance to 100 W/m^2 point	Distance to 10 W/m^2 point
FR-2115-B	XN12AF	0.1 m	3.5 m
	XN20AF	0.1 m	3.5 m
	XN24AF	0.1 m	3.5 m
FR-2125-B	XN12AF	1.1 m	1.4 m
	XN20AF	1.1 m	10.0 m
	XN24AF	1.1 m	10.0 m

⚠ WARNING



ELECTRICAL SHOCK HAZARD

Do not open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel should work inside the equipment.



Wear a safety belt and hard hat when working on the antenna unit.

Serious injury or death can result if someone falls from the radar antenna mast.

Construct a suitable service platform from which to install the antenna unit.

Serious injury or death can result if some-one falls from the radar antenna mast.

Turn off the power at the mains switch-board before beginning the installation.

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.

Do not install the display unit where it may get wet from rain or water splash.

Water in the display unit can result in fire, electrical shock or equipment damage.

⚠ WARNING

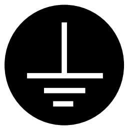
Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or equipment damage. The voltage rating of the equipment appears on the label above the power connector.

Use only the specified power cable.

Fire or equipment damage can result if a different cable is used.

⚠ CAUTION



Ground the equipment to prevent electrical shock and mutual interference.

Observe the following compass safe distances to prevent interference to a magnetic compass:

	Standard compass	Steering compass
Processor unit	1.70 m	0.90 m
Antenna unit (FR-2115-B)	1.70 m	0.90 m
Antenna unit (FR-2125-B)	2.10 m	1.20 m

EQUIPMENT LISTS

Standard supply (System with monitor)

Name	Type	Code No.	Qty	Remarks	
Antenna Unit	XN12AF-RSB-0074-062	–	1	FR-2115-B, 24 rpm, 1200 mm	CP03-24201
	XN12AF-RSB-0075-062	–		FR-2115-B, 42 rpm, 1200 mm	
	XN20AF-RSB-0074-062	–		FR-2115-B, 24 rpm, 2000 mm	CP03-19101
	XN20AF-RSB-0075-062	–		FR-2115-B, 42 rpm, 2000 mm	
	XN24AF-RSB-0074-062	–		FR-2115-B, 24 rpm, 2400 mm	
	XN24AF-RSB-0075-062	–		FR-2115-B, 42 rpm, 2400 mm	
	XN12AF-RSB-0074-063	–		FR-2125-B, 24 rpm, 1200 mm	CP03-24201
	XN12AF-RSB-0075-063	–		FR-2125-B, 42 rpm, 1200 mm	
	XN20AF-RSB-0074-063	–		FR-2125-B, 24 rpm, 2000 mm	CP03-19101
	XN20AF-RSB-0075-063	–		FR-2125-B, 42 rpm, 2000 mm	
	XN24AF-RSB-0074-063	–		FR-2125-B, 24 rpm, 2400 mm	
	XN24AF-RSB-0075-063	–		FR-2125-B, 42 rpm, 2400 mm	
Monitor	RDP-124-M-ES	–	1		
Control Unit	RCU-011	–	1		
Processor Unit	RPU-011	–	1		
Spare Parts	SP03-12500 (DC mains)	000-089-390	1 set	SP03-12501, SP03-12505	
	SP03-12510 (AC mains)	000-089-391		SP03-12501, SP03-12506	
Accessories	FP03-07410	000-089-584	1 set	FP03-07401: Accessories FP03-06201: Handle FP03-06502: Accessories FP03-06503: Hood Dust cover 03-144-1338	
Installation Materials	CP03-20400	000-089-748	Select one	CP03-19105: Monitor CP03-19104: Antenna Unit Signal Cable: S03-75-15 (15 m) Cable Assy: UL1007/2C-2V (10 m), for monitor	
	CP03-20410	000-089-749		CP03-19105: Monitor CP03-19104: Antenna Unit Signal Cable: S03-75-20 (20 m) Cable Assy: UL1007/2C-2V (10 m), for monitor	
	CP03-20420	000-089-750		CP03-19105: Monitor CP03-19104: Antenna Unit Signal Cable: S03-75-30 (30 m) Cable Assy: UL1007/2C-2V (10 m), for monitor	

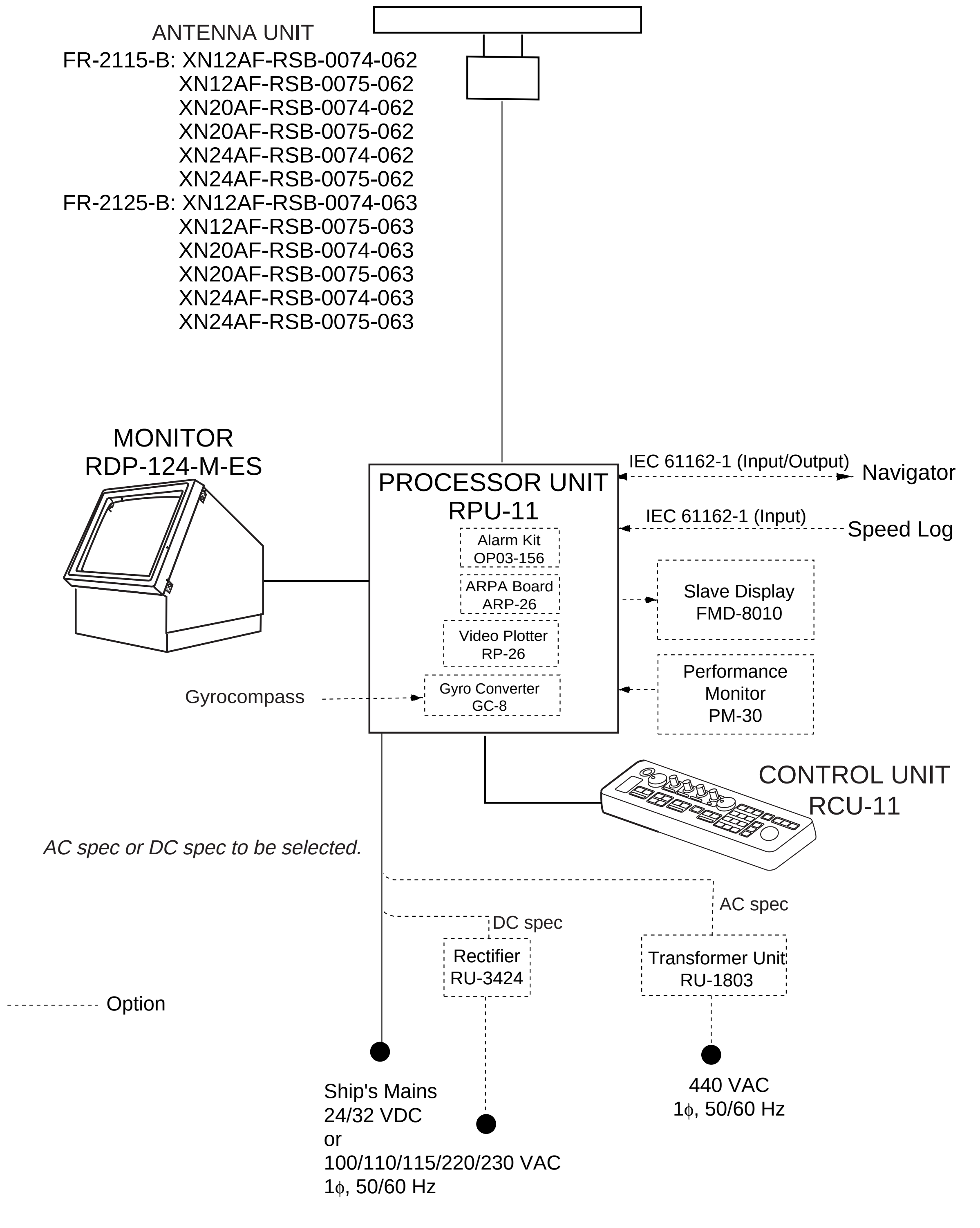
Standard supply (System without monitor)

Name	Type	Code No.	Qty	Remarks	
Antenna Unit	XN12AF-RSB-0074-062	–	1	FR-2115-B, 24 rpm, 1200 mm	CP03-24201
	XN12AF-RSB-0075-062	–		FR-2115-B, 42 rpm, 1200 mm	
	XN20AF-RSB-0074-062	–		FR-2115-B, 24 rpm, 2000 mm	CP03-19101
	XN20AF-RSB-0075-062	–		FR-2115-B, 42 rpm, 2000 mm	
	XN24AF-RSB-0074-062	–		FR-2115-B, 24 rpm, 2400 mm	
	XN24AF-RSB-0075-062	–		FR-2115-B, 42 rpm, 2400 mm	
	XN12AF-RSB-0074-063	–		FR-2125-B, 24 rpm, 1200 mm	CP03-24201
	XN12AF-RSB-0075-063	–		FR-2125-B, 42 rpm, 1200 mm	
	XN20AF-RSB-0074-063	–		FR-2125-B, 24 rpm, 2000 mm	CP03-19101
	XN20AF-RSB-0075-063	–		FR-2125-B, 42 rpm, 2000 mm	
	XN24AF-RSB-0074-063	–		FR-2125-B, 24 rpm, 2400 mm	
	XN24AF-RSB-0075-063	–		FR-2125-B, 42 rpm, 2400 mm	
Control Unit	RCU-011	–	1		
Processor Unit	RPU-011	–	1		
Spare Parts	SP03-12500 (DC mains)	000-089-390	1	SP03-12502, SP03-12505	
	SP03-12510 (AC mains)	000-089-391		SP03-12502, SP03-12506	
Accessories	FP03-07510	000-089-586	1	FP03-06502, FP03-07401	
Installation Materials	CP03-19100	000-089-393	Select one	CP03-19104: Antenna Unit CP03-19105: Monitor Signal Cable: S03-75-15 (15 m)	
	CP03-19110	000-089-394		CP03-19104: Antenna Unit CP03-19105: Monitor Signal Cable: S03-75-20 (20 m)	
	CP03-19120	000-089-395		CP03-19104: Antenna Unit CP03-19105: Monitor Signal Cable: S03-75-30 (30 m)	

Optional equipment

Name	Type	Code No	Qty	Remarks
Remote Display	FMD-8010	–	1	
Gyro Converter	GC-8-2	008-446-520	1 set	Separate order
	GC-8-1	008-446-270		Built in
Interswitch	RJ-7	–	1	
Interswitch	RJ-8	–	1	
Performance Monitor	PM-30	–	1	Mandatory for IMO radar
Transformer Unit	RU-1758	000-030-416	1	
	RU-1803	000-030-420	1	
Rectifier	RU-3424	000-030-497	1	
ARPA	ARP-26-1E	008-492-300	1	Built in
	ARP-26-2E	008-485-500	1	Separate order
Video Plotter	RP-26-Z-1E	008-492-520	1	Built in
Video Plotter	RP-26-Z-2E	008-485-520	1	Separate order
Alarm Kit	OP03-156	008-500-650	1	
Performance Monitor Inst. Kit	OP03-150	008-485-490	1	
Power Cable	CVV-S (8X2C)-15C	000-560-634	1	
AC-DC Conversion Kit	OP03-161-24	008-499-760	1	24 rpm antenna
	OP03-161-42	008-499-770	1	42 rpm antenna
Interface Unit	IF-2300	–	1	Mandatory for IMO radar

SYSTEM CONFIGURATION



I/O Data Sentences

Input: GGA, RMA, RMB, RMC, GLL, ZDA, VBW, VHW, VTG, MWV, VWT, VWR, VDR, DPT, DBT, DBS, MTW, BWR, BWC, WPT, RTE

Output: RAOSD, RARSD, RATTM

1. MOUNTING

1.1 Antenna Unit

1.1.1 Mounting considerations

- The antenna unit is generally installed either on top of the wheelhouse or on the radar mast, on a suitable platform. Locate the antenna unit where there is a good all-round view.
- No funnel, mast or derrick should be within the vertical beamwidth of the antenna in the bow direction, especially zero degrees ±5°, to prevent blind sectors and false echoes on the radar picture.
- It is rarely possible to place the antenna unit where a completely clear view in all directions is available. Thus, you should determine the angular width and relative bearing of any shadow sectors for their influence on the radar at the first opportunity after fitting.
- Locate the antenna of a direction finder clear of the antenna unit to prevent interference to the direction finder. A separation of more than two meters is recommended.
- To lessen the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment. Also avoid running the cable in parallel with power cables.
- A magnetic compass will be affected if placed too close to the antenna unit. Observe the following compass safe distances to prevent deviation of a magnetic compass: Standard compass, 1.70 m (FR-2115-B), 2.10 m (FR-2125-B), Steering compass, 0.90 m (FR-2115-B), 1.20 m (FR-2125-B).
- Do not paint the radiator aperture, to ensure proper emission of the radar waves.
- The signal cable run between the antenna and the display is available in lengths of 15 m (standard), 20 m, and 30 m. Whatever length is used it must be unbroken; namely, no splicing allowed.
- The antenna base is made of cast aluminum. To prevent electrolytic corrosion of the antenna base, use the seal washers and corrosion-proof rubber mat.
- Deposits and fumes from a funnel or other exhaust vent can adversely affect the aerial performance and hot gases may distort the radiator portion. The antenna unit must not be mounted where the temperature is more than 70°C.
- Leave sufficient space around the unit for maintenance and servicing. See the antenna unit outline drawing for recommended maintenance space.

1.1.2 Assembling the antenna unit

The antenna unit consists of the antenna radiator and the antenna unit chassis, and they are packed separately. Fasten the antenna radiator to the antenna unit chassis as follows:

1. **For the XN20AF, XN24AF**, attach two guide pins to the underside of the antenna radiator.
2. Remove the waveguide cap from the radiator bracket. The cap may be discarded.
3. Coat the waveguide flange with anticorrosive sealant as shown in Figure 1-1.

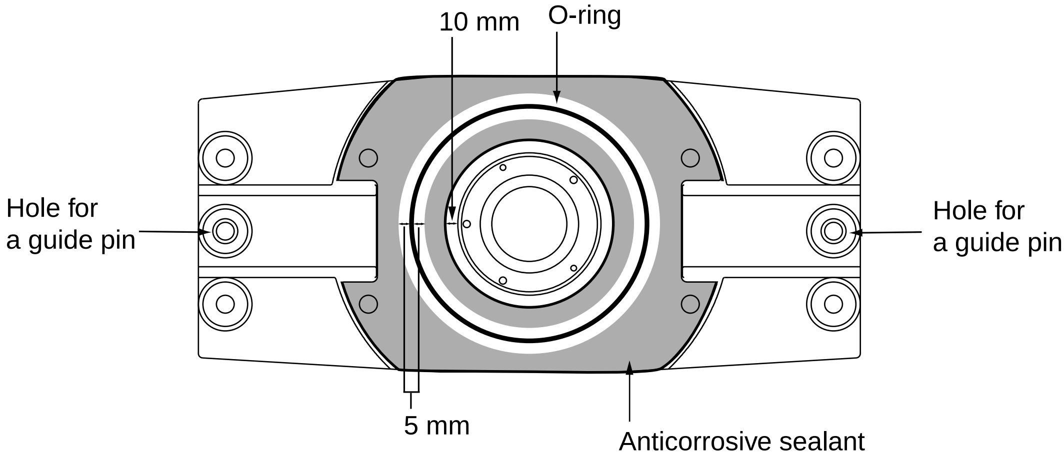


Figure 1-1 Coating the waveguide flange with anticorrosive sealant

4. Coat fixing holes for the antenna radiator with anticorrosive sealant.
5. Grease the O-ring and set it to the O-ring groove of the radiator flange.
6. Set the antenna radiator to the radiator bracket.
7. **For the XN20AF, XN24AF,** coat hex bolts (M8X40, slotted washer-head, 8 pcs.) with anticorrosive sealant and use them to loosely fasten the antenna radiator to the antenna unit chassis. For the XN12AF, coat hex bolts, flat washers and spring washers with anticorrosive sealant and use them to loosely fasten the antenna radiator to the antenna unit chassis.
8. **For the XN20AF, XN24AF,** remove two guide pins (inserted at step 1).
9. Tighten the bolts loosely fastened at step 7.

⚠ CAUTION
Be sure to remove the guide pins. Injury may result if the guide pins loosen and fall.

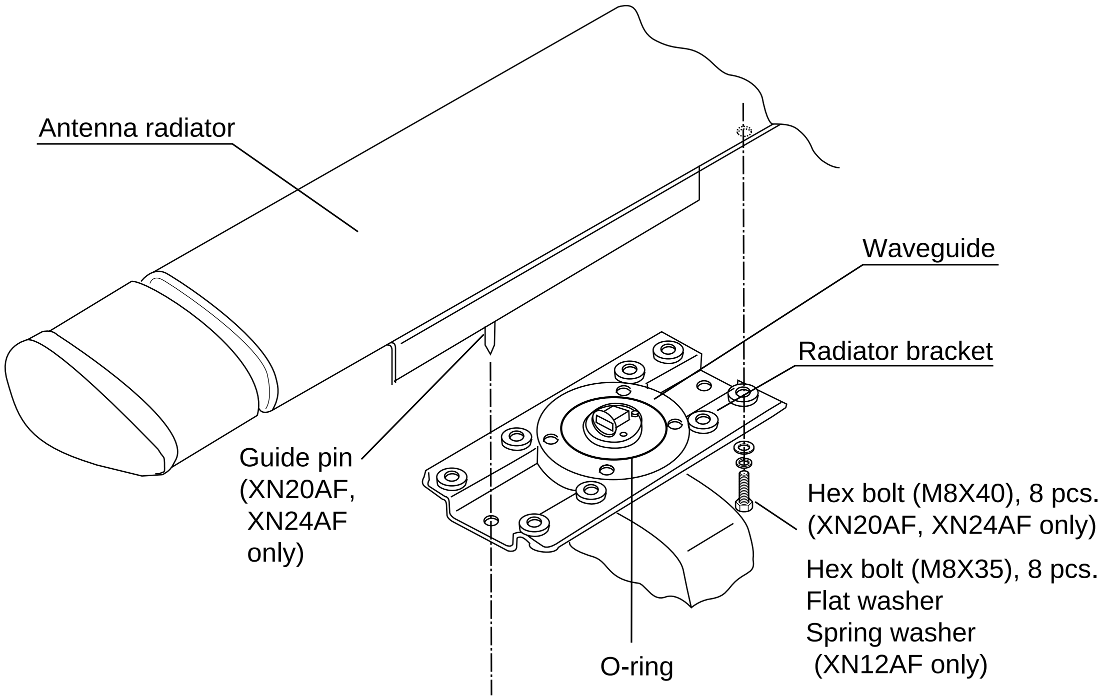


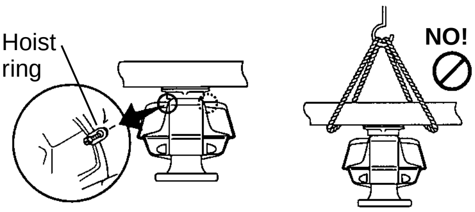
Figure 1-2 Fastening the radiator to the radiator bracket

1.1.3 Fastening the antenna unit to the mounting platform

The antenna unit may be assembled before hoisting it to the mounting platform. However, do not lift the antenna unit by the radiator. Always hold the unit by its housing. When using a crane or hoist, lift the unit by the hoist rings which should be fastened to the bolt fixing covers of the antenna housing.

⚠ CAUTION

DO NOT hoist the antenna unit by the radiator; hoist it by the hoist rings. (Be sure to remove rings after hoisting the antenna unit.)



1. Construct a suitable mounting platform referring to the outline drawing at the back of the manual.
2. Drill four mounting holes of 15 mm diameter and one cable entry hole of about 50 mm diameter in the mounting platform.
3. Lay the rubber mat (supplied) on the mounting platform.
4. Place the antenna unit on the rubber mat orienting the unit so the bow mark on its base is facing the ship's bow.

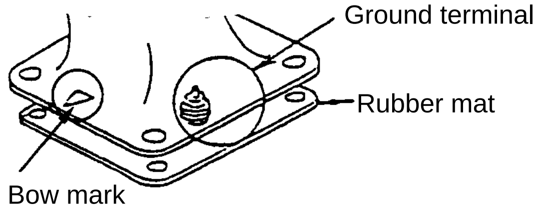
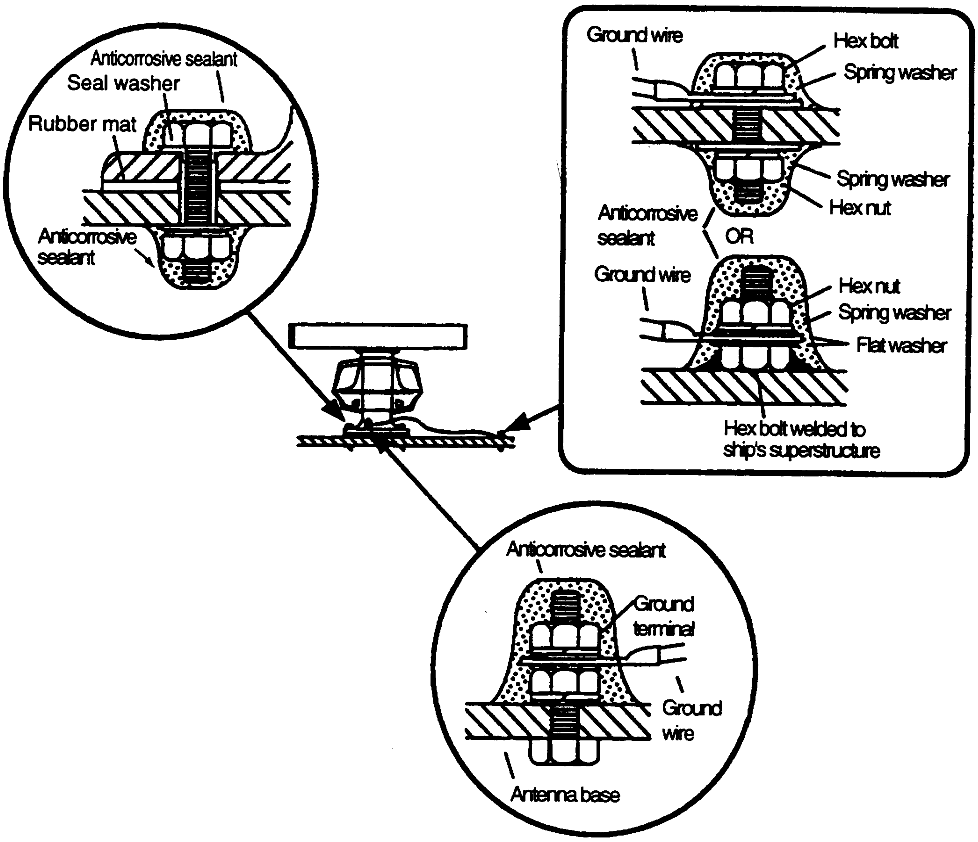


Figure 1-3 Antenna unit, front view

5. Fasten the antenna unit to the mounting platform with four sets of M12X60 hex bolts, nuts, flat washers and seal washers (supplied).
6. Using hex bolt (M6X25), nut (M6) and flat washer (M6), establish the ground system on the mounting platform as shown in Figure 1-4. The location should be within 370 mm of the ground terminal on the antenna unit. Connect the ground wire (RW-4747, 370 mm, supplied) between the grounding point and ground terminal on the antenna unit. Coat the entire ground system with silicone sealant (supplied).



⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Figure 1-4 How to mount the antenna unit

1.2 Processor Unit

1.2.1 Mounting considerations

When selecting a mounting location, keep in mind the following points:

- The processor unit must be mounted horizontally.
- DO NOT place any item on the top of the processor unit.
- Locate the unit out of direct sunlight and away from heat sources because of heat that can build up inside the cabinet.
- Locate the equipment away from places subject to water splash and rain.
- Be sure the mounting location is strong enough to support the weight of the unit under the continued vibration which is normally experienced on the ship. If necessary reinforce the mounting location.
- Determine the mounting location considering the length of the following cables:
  a) Signal cable from the antenna unit
  b) Power cable from the ship's mains
  c) Monitor cable from the monitor
  d) Control cable from the control unit
- Leave sufficient space on the sides and rear of the unit to facilitate maintenance. Also, leave a foot or so of "service loop" in cables behind the unit for servicing ease.
- A magnetic will be adversely affected if placed too close to the processor unit. Observe the following compass safety distances to prevent deviation of a magnetic compass: Standard compass, 1.70 m, Steering compass, 0.90 m.

1.2.2 Mounting the processor unit

1. Drill four holes of 12 mm in diameter in the mounting location.
2. Unfasten 15 binding screws (M4) to remove the processor unit cover.

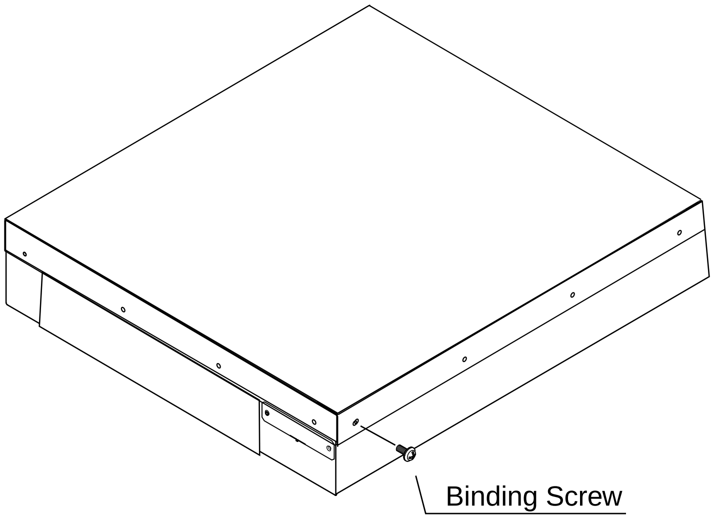


Figure 1-5 Processor unit

3. Fasten the processor unit to the mounting location with four each of M10 bolts, nuts and washers, using the pipe box spanner (supplied). See the figure on the next page for location of fixing holes.

   <u>How to access the rear-left fixing hole</u>

   The rear-left fixing hole is hidden under the PTU board cover. To access it do the following:

   a) Loosen five M3X8 screws at the top of the PTU board cover and two M4X8 screws at the front of the cover.

   b) Grasp the knob on the cover and slide the cover toward the front of the unit to release it.

   <u>How to access the front-right fixing hole</u>

   The front-right fixing hole is hidden beneath the RGB Board. To access it do the following:

   a) Unfasten the M4X8 pan-head screw from the RGB board mounting plate.

   b) Unfasten two pan-head screws (M3X10) fixing the M-card cover.

4. After mounting the unit, fasten the PTU board cover and RGB board mounting plate, and then close the processor unit.

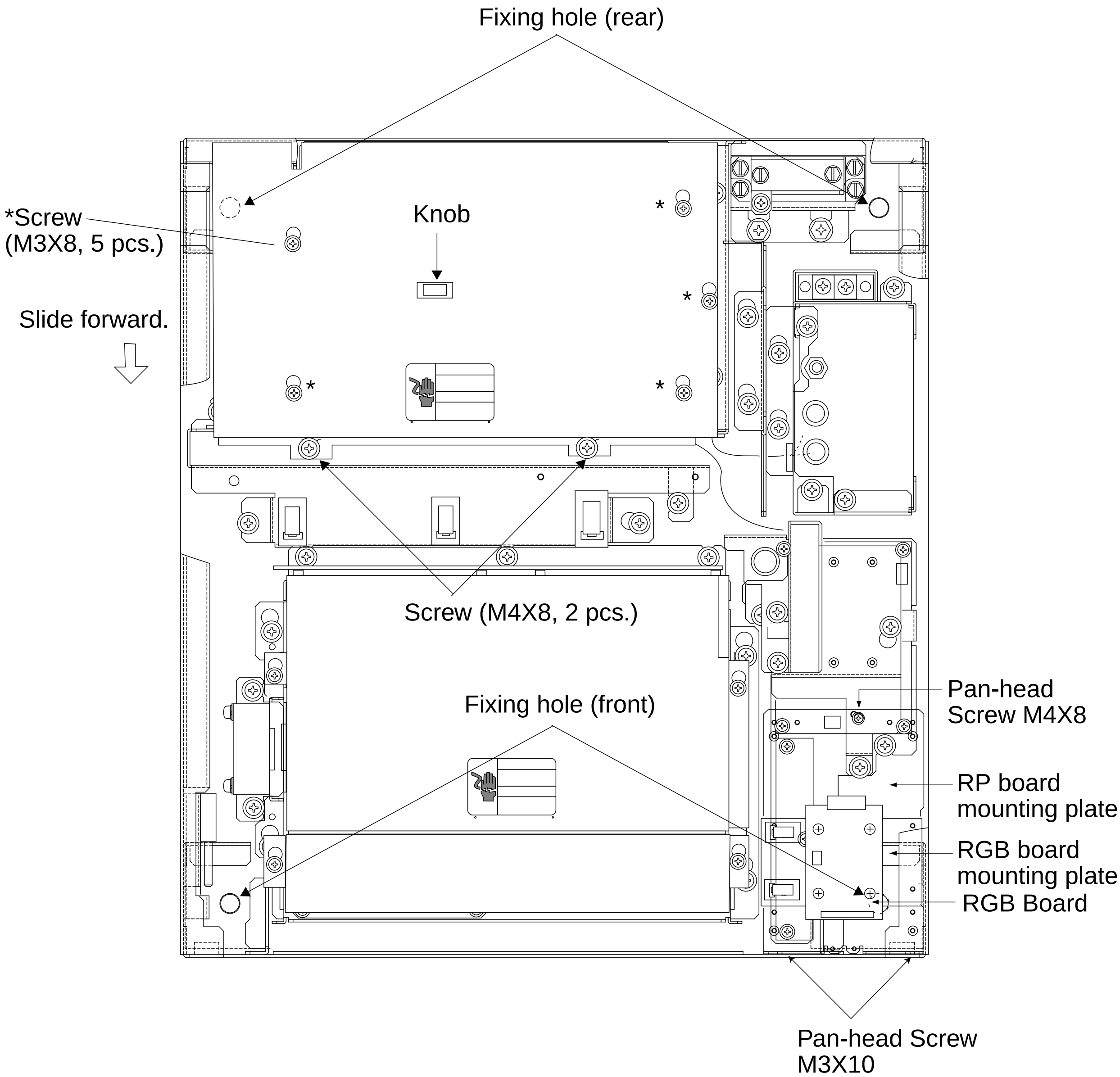


Figure 1-6 Processor unit, inside view

1.3 Monitor

The FR-2115-B/2125-B is available with or without a monitor. This section shows how to mount the monitor supplied.

Mounting considerations

- The monitor is designed to be mounted on a desktop.
- Locate the monitor where it can be easily operated while viewing the screen and operating the control unit.
- DO NOT place the monitor on the top of the processor unit.
- Locate the monitor out of direct sunlight and away from heat sources because of heat that can build up inside the cabinet.
- Locate the equipment away from places subject to water splash and rain.
- Be sure the mounting location is strong enough to support the weight of the unit under the continued vibration which is normally experienced on the ship. If necessary reinforce the mounting location.
- The length of the monitor cable which runs between the processor unit and the monitor is 10 m. Keep this distance in mind when selecting the mounting location for the monitor.
- Leave sufficient space on the sides and rear of the unit to facilitate maintenance.

1.3.2 Mounting the monitor

1. Drill four holes of 12 mm in diameter in the mounting location, referring to the outline drawing for mounting dimensions.
2. Unfasten two M4X10 screws to dismount the monitor cover.
3. Unfasten two sets of M10 bolts, plain washers and spring washers at the front of the monitor to separate the monitor from the mounting base.
4. Pull the monitor forward about 4 centimeters and then lift if from the mounting base.
5. Fasten the mounting base to the mounting location with M10 bolts, nuts and washers (local supply), using the pipe box wrench supplied. Make sure there is 3mm protrusion under the nut.
6. Lay the monitor on the top of the mounting base, making sure the rear pin on the monitor is mated with the slit in the mounting base. Fix the mounting base with the two sets of bolts, and washers unfastened at step 3.
7. Fasten the monitor cover.

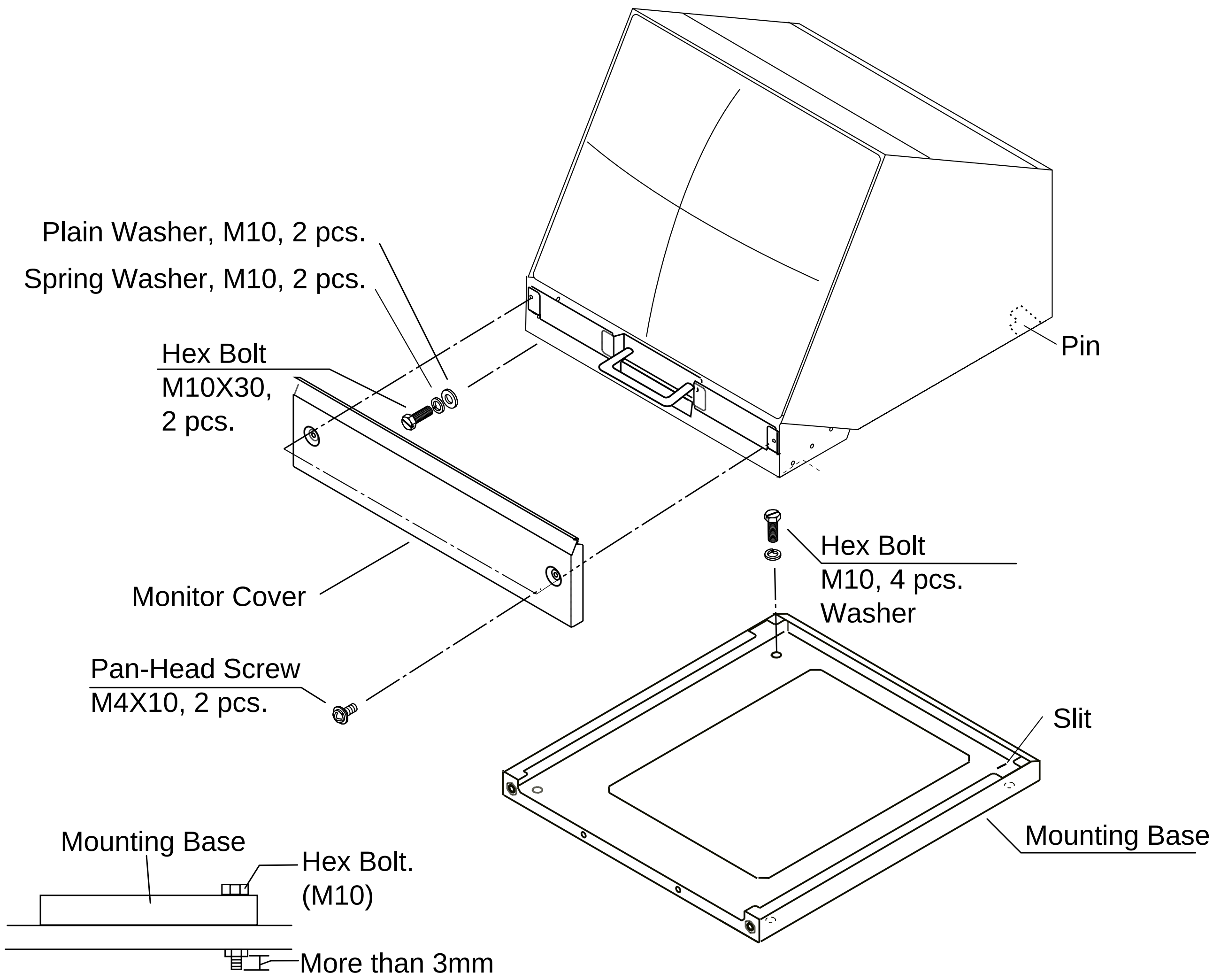


Figure 1-7 Monitor

1.4 Control Unit

1.4.1 Mounting procedure

1. Attach rubber to feet to the bottom of the keyboard if the keyboard is not going to be permanently fixed. To fix the keyboard to a desired location, fasten the KB fixing plate to the keyboard and desired location with two upset screws (M5X10, supplied) and two tapping screws (ϕ6.5, local supply) as below.

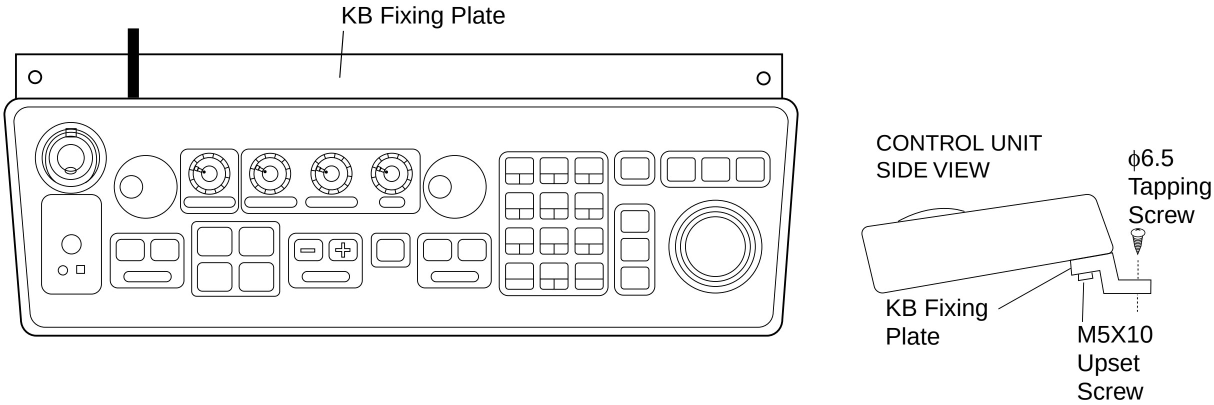


Figure 1-8 How to attach KB fixing plate

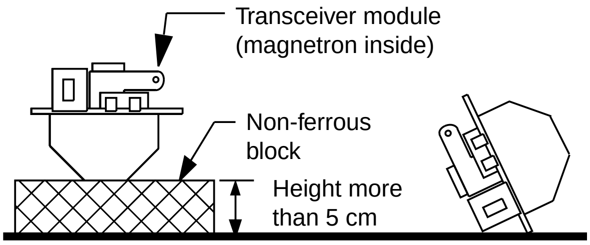
2. Set KB dust cover (supplied) to the control unit.

2. WIRING

2.1 Antenna Unit

⚠ CAUTION

The magnetron in the transceiver module will demagnetize if it contacts ferrous material. When dismounting the transceiver module, lay it on its side or on top of non-ferrous material as shown below.



2.1.1 Mounting the antenna chassis

1. Open the antenna unit cover.
2. Disconnect plugs P611, P801 and P821 from the antenna unit.
3. Unfasten two bolts to dismount the transceiver module.

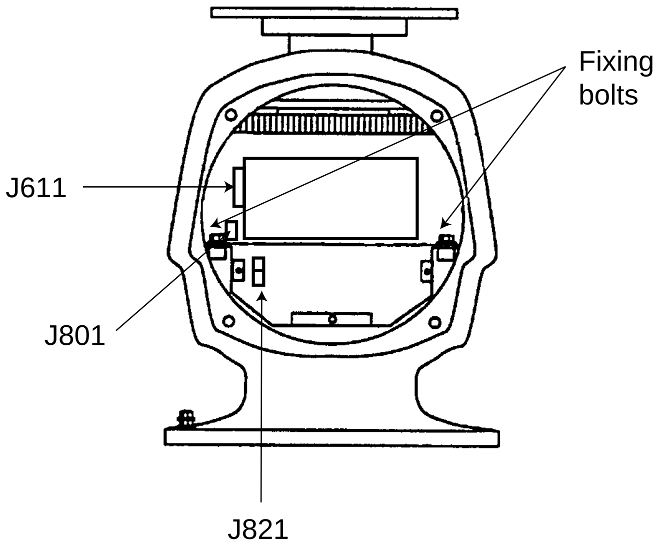


Figure 2-1 Antenna unit, front view

4. Unfasten the four fixing bolts on the cable gland at the base of the antenna unit. Remove clamping ring, rubber gasket and washers.

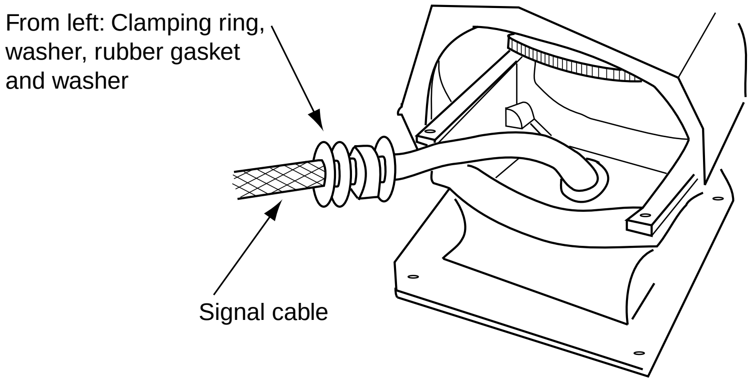


Figure 2-2 Antenna unit, front view, cover removed

5. Pass the signal cable through the cable entry hole in the antenna unit mounting platform. Trim the cable so about 80 cm of it protrudes past the cable gland.
6. Slide the clamping ring, washer, rubber gasket and washer onto the cable in that order.
7. Fabricate the signal cable as shown on page 2-4.
8. Referring to Figure 2-3, pass the outer and inner shields between the signal cable and the clamping ring. Fasten the cable gland.

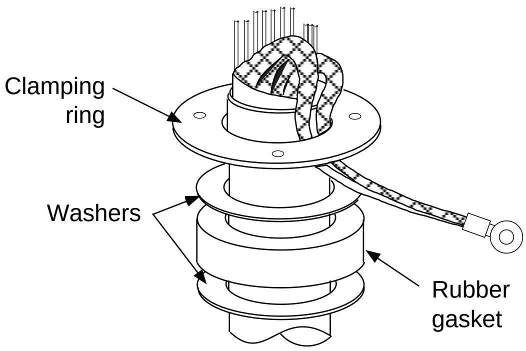


Figure 2-3 Passing cable shields between cable and clamping ring

9. Connect the signal cable to the terminal board RTB801 by referring to the interconnection diagram. Leave slack in the coaxial wire to prevent breakage.
10. Bind cores of cables with cable ties.
11. Mount the transceiver module. Connect plugs P611, P801 and P821. Fasten the shield to the ground terminal on the transceiver module.

12. If the antenna is mounted 2° or more left of ship's bow, adjust the position of S901 so it becomes "on" (contact between #1 and #2 on pcb MP-3795). To access S901, open the bow side cover; S901 is above the drive gear.

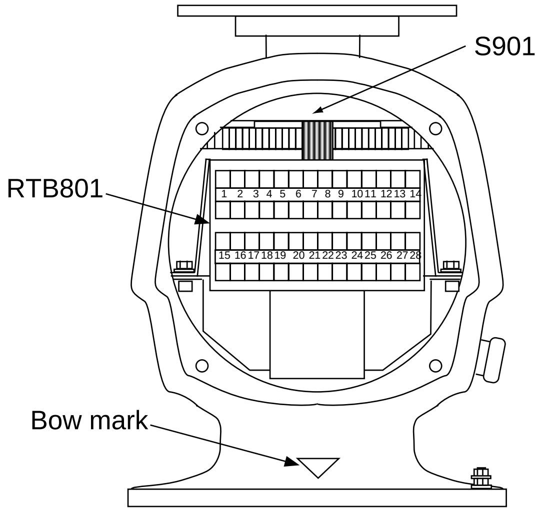


Figure 2-4 Antenna unit, front view

13. Confirm that all screws are tightened and all wiring is properly made. Coat waterproofing gasket, bolts and tapping holes of antenna unit with silicone grease. Check that the waterproofing gasket is seated as shown in Figure 2-5. Close the antenna unit cover.

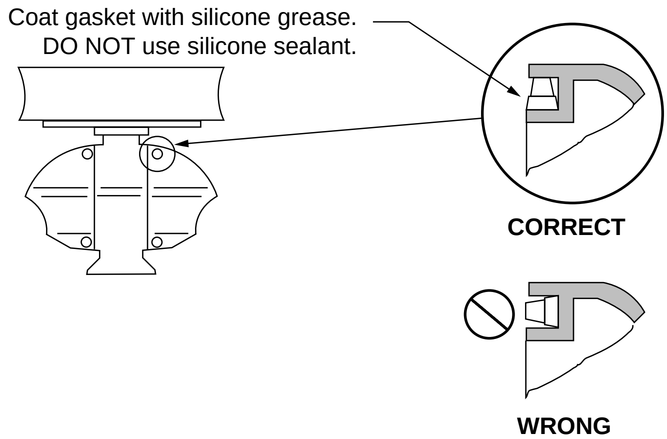


Figure 2-5 Correct seating of waterproofing gasket

2.1.2 Fabricating signal cable S03-75

1. Remove the vinyl sheath by 450 mm.
2. Slide the clamping ring, washer, rubber gasket and washer onto the signal cable in that order.
3. Unravel the outer shield to expose the cores in the outer layer. Then, unravel the inner shield to expose the cores in the inner layer. Label all inner cores to aid in identification.
4. Attach EMI cores to all inner cores and all outer cores, and bind them with cable ties, etc. Note that there are two types of the EMI cores, thick and thin.
5. Trim each core (except coaxial wire) considering its location on the terminal board in the antenna unit.
6. Trim the inner and outer shields leaving 500 mm each. Twist shields together and attach crimp-on lug FV5.5-4 (blue, ϕ4).
7. Remove insulation of each core by about 6 mm. Fix crimp-on lug FV1.25-3 (red, ϕ3) to each core.
8. Fabricate the coaxial cable. Make the length 10 mm longer than the shield to prevent wire strain. Attach crimp-on lug FVD1.25-3 (red, ϕ3) to coaxial cable.

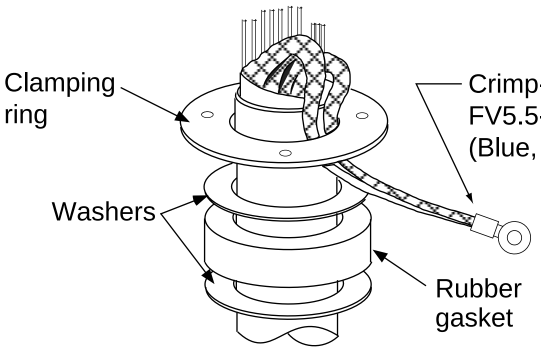


Figure 2-7 How to ground signal cable S03-75

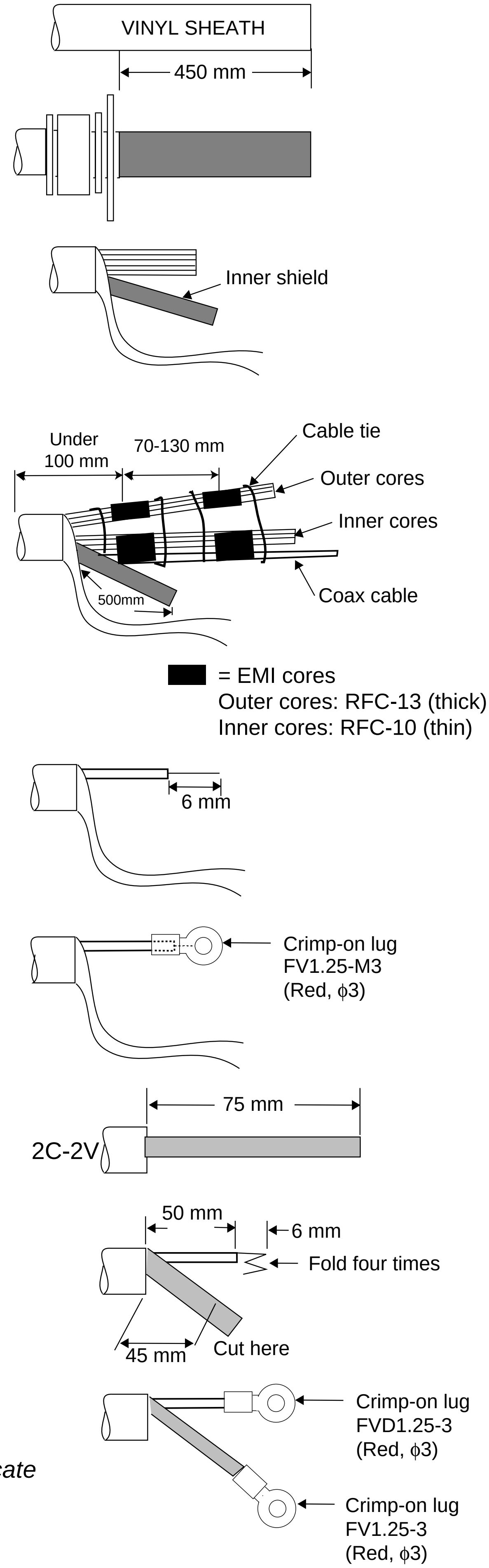


Figure 2-6 How to fabricate signal cable S03-75

2.2 Processor Unit

Two cables are terminated at the processor unit: the signal cable S03-75 and the power cable. The signal cable comes with a connector preattached to it for connection to the processor unit. Fabricate the power cable as below.

2.2.1 Fabricating the AC power cable

1. Remove the vinyl sheath by 80 mm. Cut off jute tape wrapped around the armor. Unravel the armor to expose the cores by about 35 mm.
2. Remove insulation of cores by about 10 mm. Fix crimp-on lugs to the cores and armor.
3. Cover the armor with vinyl tape, leaving the portion which will lie inside the cable clamp untaped.

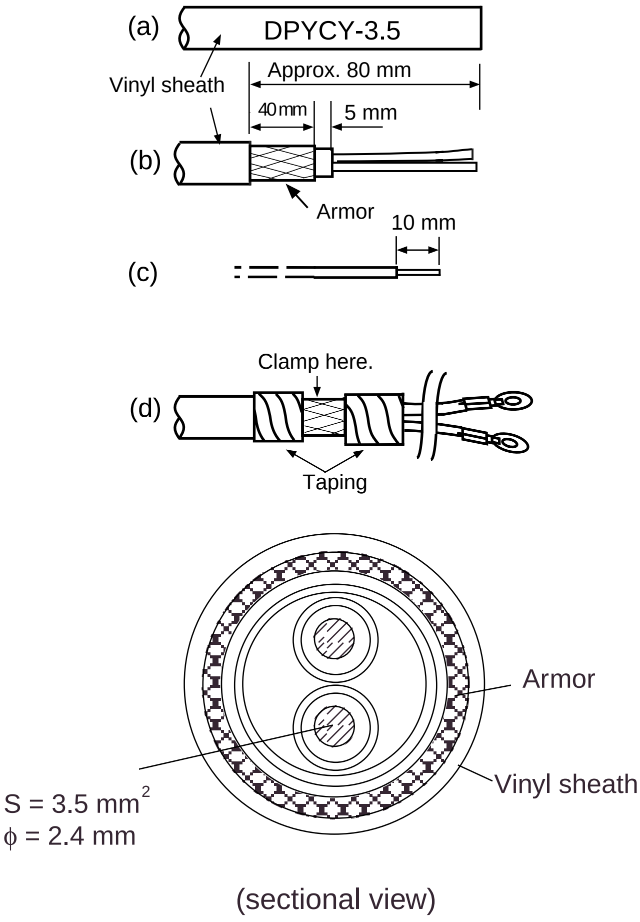


Figure 2-8 Fabricating power cable DPYCY-3.5

2.2.2 Fabricating the DC power cable (CVV-S 8X2C, option)

1. Remove the vinyl sheath by 100 mm.
2. Unravel the braided shield 60 mm from end of cable.
3. Remove the jute tape and inclusion from cable.
4. Expose the cores by 50 mm.
5. Expose the shield by 60 mm. Tape the shield, leaving 10 mm exposed.
6. Remove the sheath of cores by 10 mm. Attach crimp-on lug type 8NK4 to the cores and crimp-on lug type FV5.5-4 (yellow) to the shield.
7. Tape the cable as shown in the figure below. Fasten the shield to screw (M4) on the cable clamp.

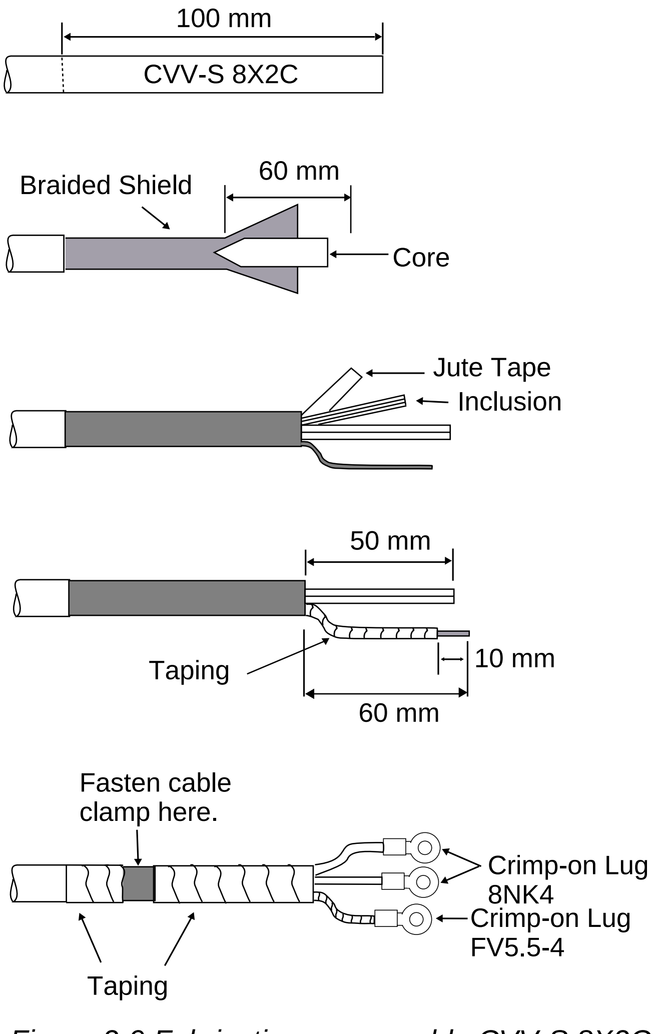


Figure 2-9 Fabricating power cable CVV-S 8X2C

2.2.3 Leading in cables to the processor unit

Cables are led in to the processor unit through the cable clamp at the rear of the unit. Use the shielding foam (supplied) as below to protect against noise radiation.

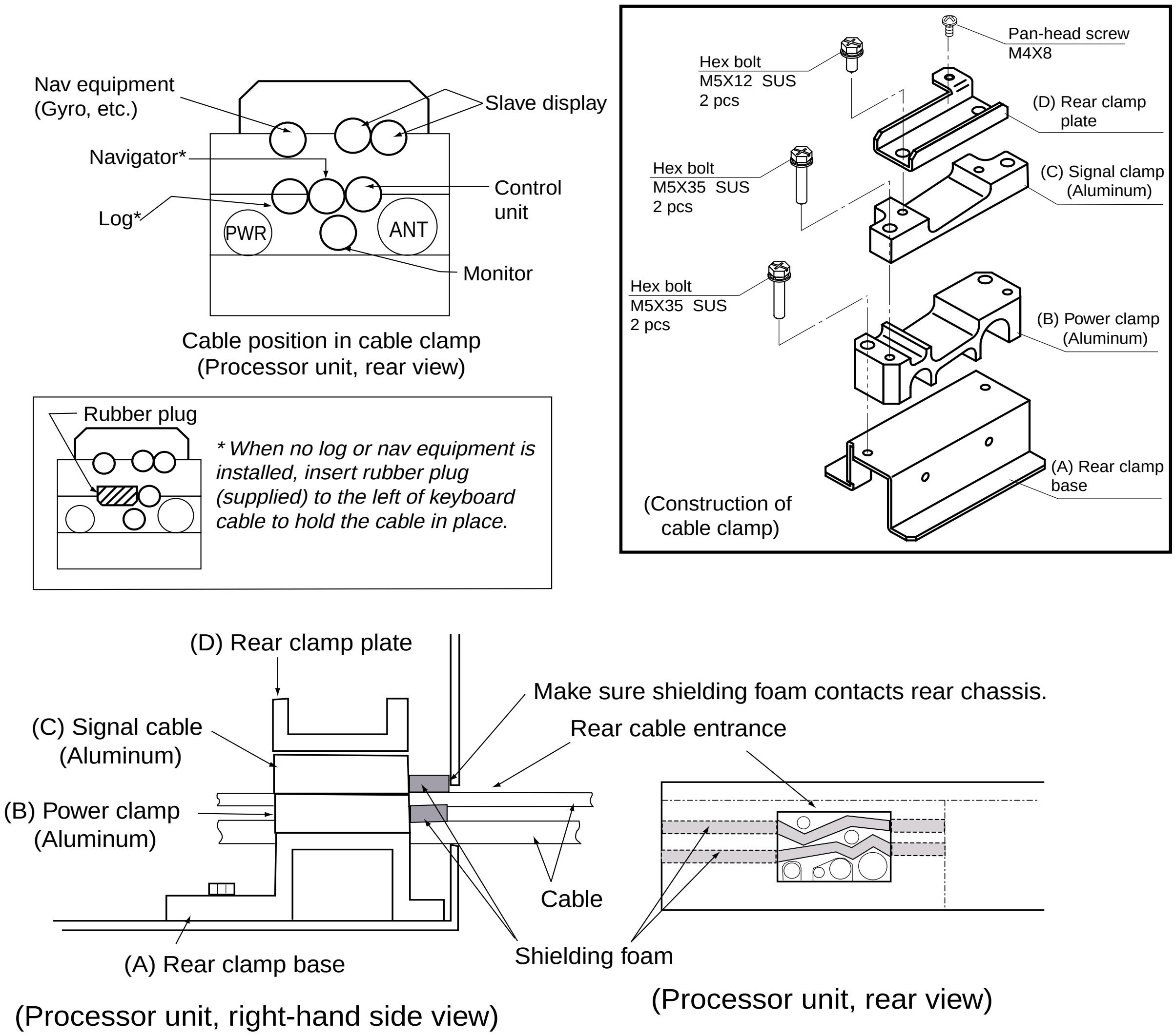


Figure 2-10 Cable clamp position

- Place shielding foam between cables, and then attach foam to aluminum clamps.
- Fill unused clamp holes with shielding foam.
- Connect a ground wire between the earth terminal on the processor unit and ship's superstructure.

⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

2.3 Monitor

2.3.1 Connection of monitor cable inside processor unit

The monitor cable (a monitor cable comes with FURUNO-supplied monitor) runs between the RGB Board (inside the processor unit) and the monitor. Route it inside the processor unit as below. Connect the cable to J2 on the RGB Board. If a converter adaptor is used it may be necessary to route the cable differently than shown. In any case be sure the cable does not touch the TX-HV Board.

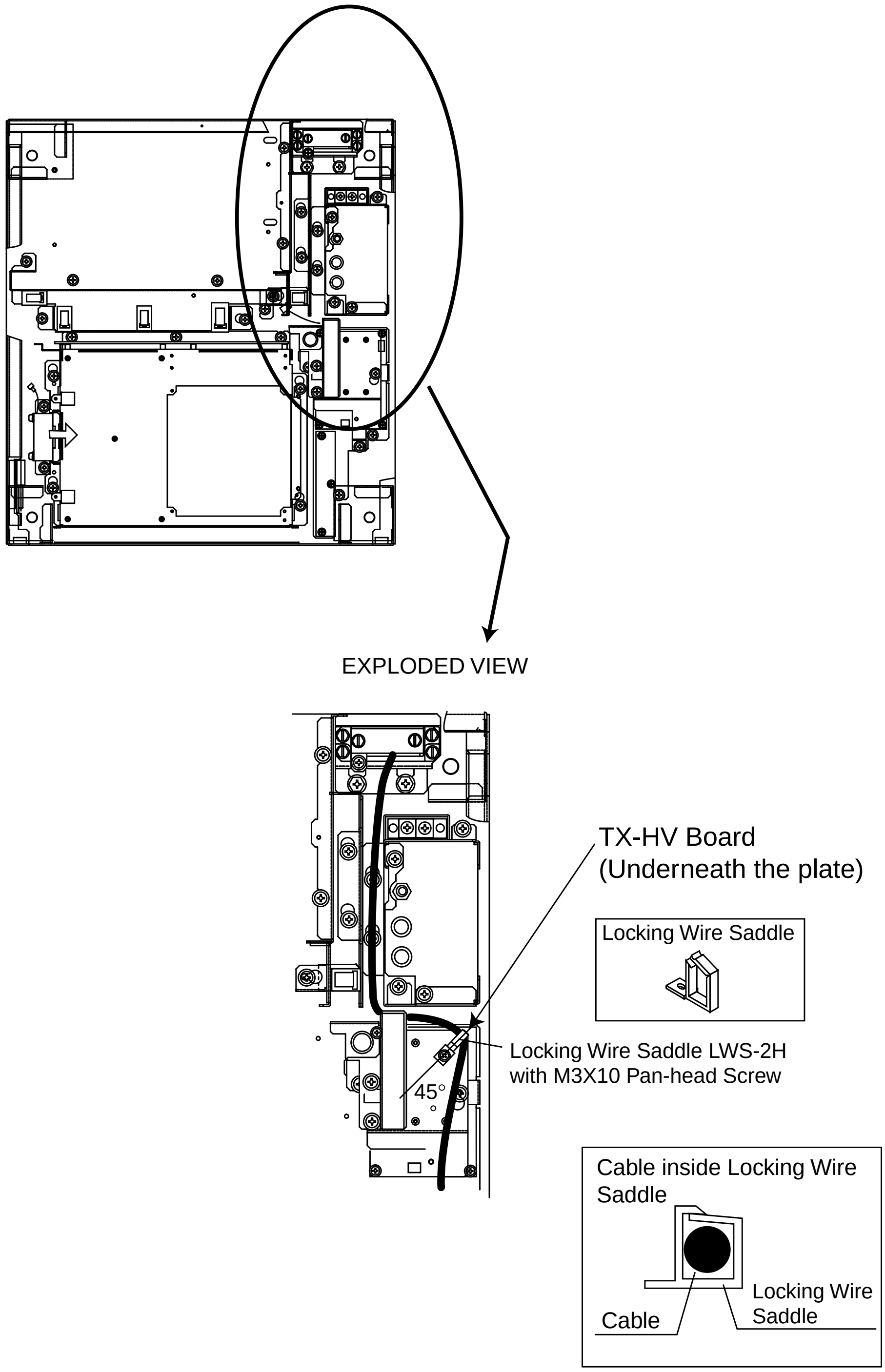


Figure 2-11 Processor unit, inside view

2.3.2 Connection of monitor cable inside the monitor

Connect the monitor cable inside the monitor as below.

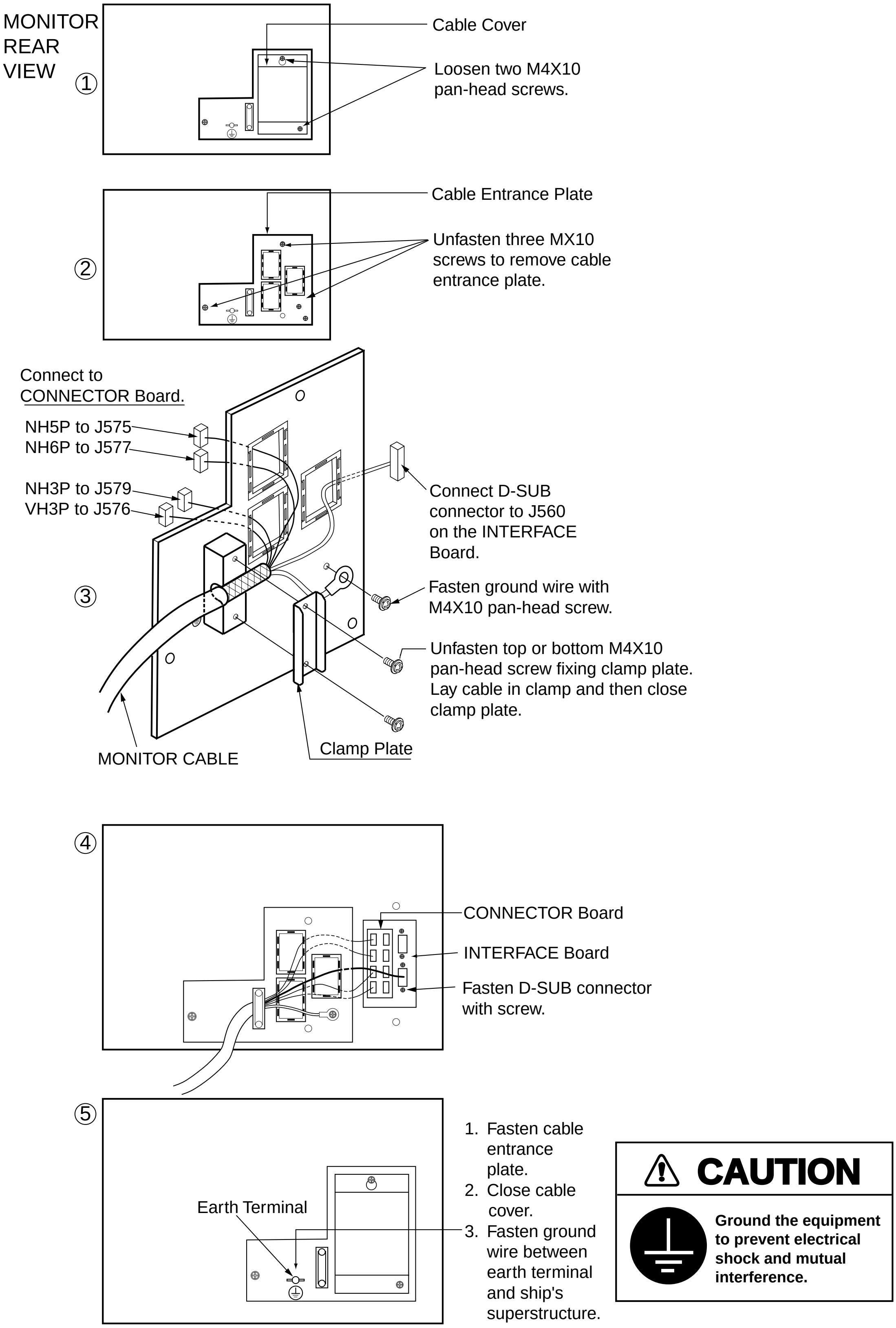


Figure 2-12 Connection of monitor

2.4 Control Unit

1. Open the processor unit.
2. Lead in the control unit cable assy. (option) from the rear entrance of the processor unit.
3. Inside the processor unit, fasten ground the wire of the cable assembly with an M4 screw on the chassis.
4. Plug in two connectors of control unit cable to P412 and J583.

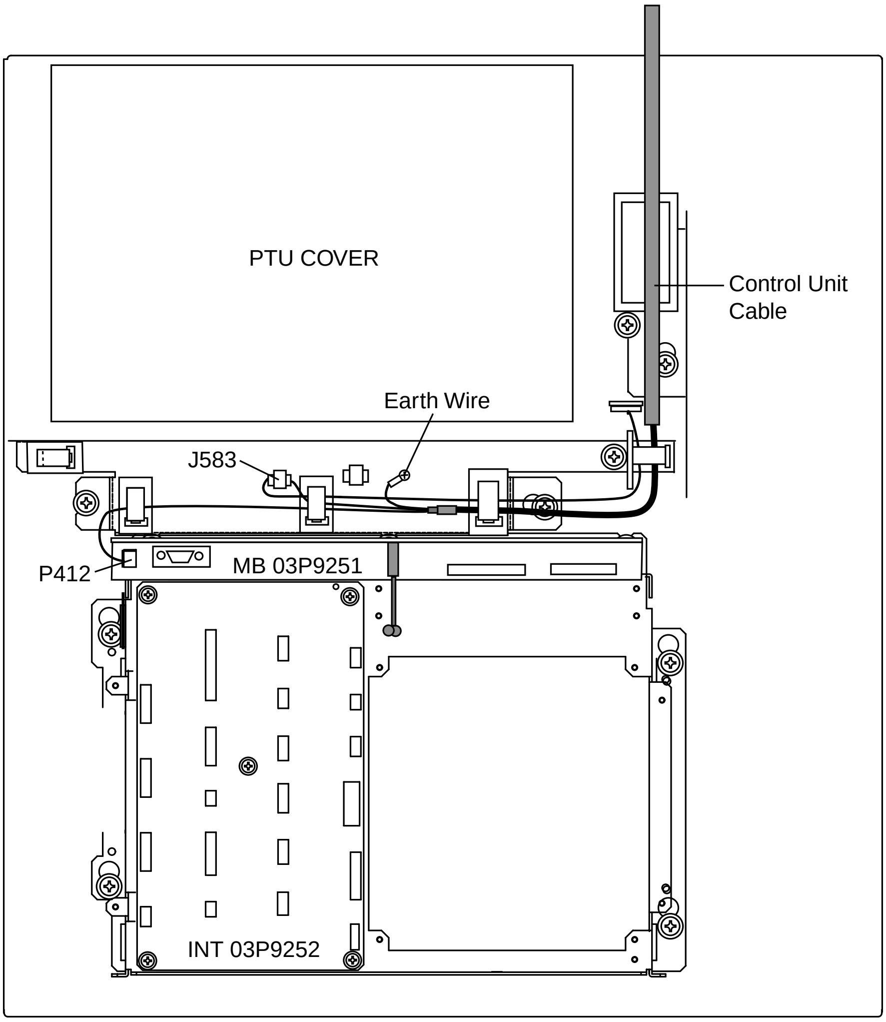


Figure 2-13 Processor unit, inside view

2.5 External Equipment

Open the processor unit. Remove the cover from the INT Board. Connect signal, power (ship's mains and power supply), gyro, log and monitor cables as below. Optional equipment are connected to the INT Board - see the next page for information.

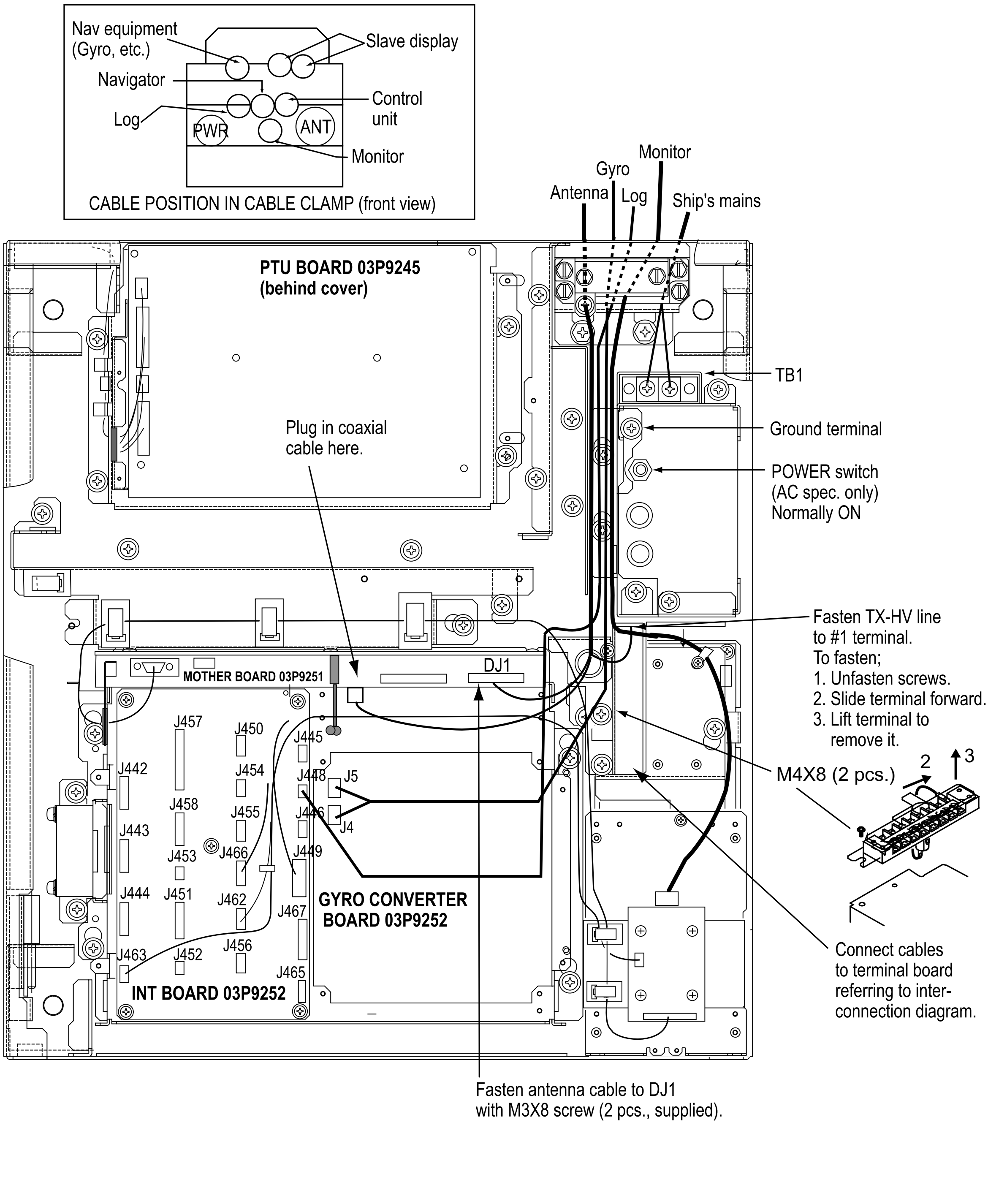


Figure 2-14 Processor unit, inside view

Connectors on the INT Board

Table 2-1 Connectors on the INT Board

Signal Name	Name on PCB	Connector No.	Connector Type	Applicable Equipment	Remarks
INPUT SIGNAL					
Gyro signal		J4	VH, 3 pin		On pcb A64P1106 (option)
		J5	VH, 5 pin		
Speed log signal	LOG	J448	NH, 3 pin		200 pulses/nm, etc.
Radar buoy signal	RADAR BUOY	J445	NH, 4 pin		
Remote display signal	EXT-RADAR or RJ-7	J458	NH, 8 pin		
OUTPUT SIGNAL					
External ARPA signal	EXT-ARPA	J444	NH, 8 pin		Heading, bearing, Tx trigger
Slave display signal	SLAVE	J442 J443	NH, 8 pin	CD-140, CD-141, GD-500, GD-500MK2, FMD-800, FMD-8010 *1 *1 Monitor for FR-2115-B/2125-B can be used as slave display unit.	Heading, bearing, video, Tx trigger
Buzzer signal	EXT-BUZ	J451	NH, 9 pin	Speaker w/amp	Speaker signal
Monitor signal		J449	NH, 10 pin		VER synchronous, HOR synchronous, video
RS-232C	RS-232C	J456	XH, 4 pin		
Analog	ANALOG	J453	NH, 3 pin		
External buzzer	EXT ALARM (AC)	J452	NH, 3 pin		
INPUT/OUTPUT SIGNAL					
INS Data	INS. DATA	J455	NH, 5 pin		
RJ-7	RJ-7	J457	NH, 15 pin		
RJ-8	RJ-8	J416	NH, 4 pin		On Mother Board 03P9251
Nav data	NAV DATA	J450	NH, 5 pin		
ARPA data	ARPA DATA	J454	NH, 5 pin		
PM_ON_OFF	PM_PRINT	J411	XH, 3 pin		On Mother Board 03P9251

How to attach NH connector

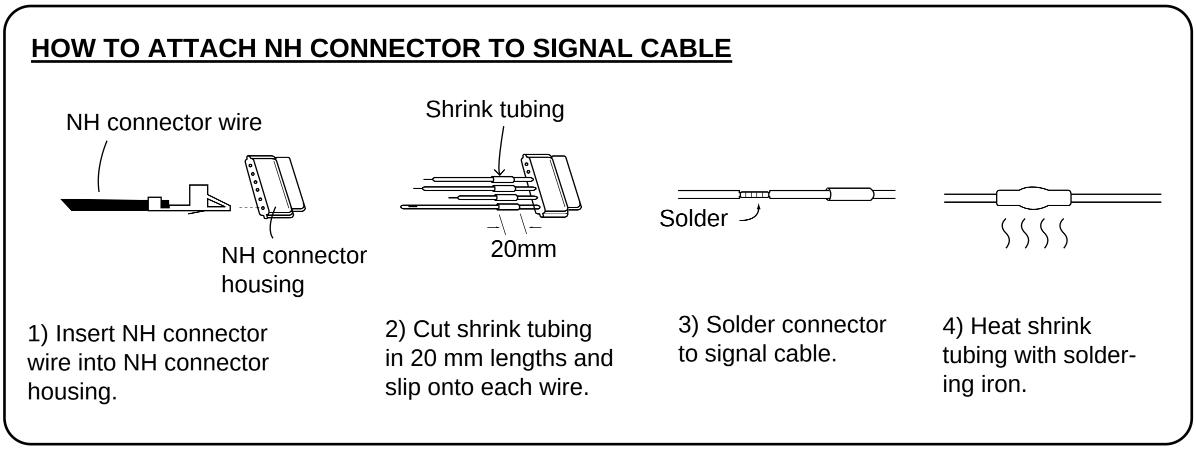


Figure 2-15 How to attach NH connector

2.6 AC Power Specification of Processor Unit

For 100 VAC or 220 VAC power, add or delete jumper wires on the PTU Board and change the power fuses inside the processor unit as shown in the table below according to ship's mains. The figure below shows the location of the power fuses and the jumper wires on the PTU Board.

Table 2-2 Jumper wire setting on the PTU board, fuse rating and power specification

PCB	Power Spec. (VAC)	Antenna rpm	JP1	JP2	JP3	JP4	JP91	JP92	Power Fuse
03P9245A	100/110/115	24 rpm	YES	YES	YES	NO	NO	NO	10A
03P9245D	220/230	24 rpm	NO	NO	NO	YES	NO	NO	5A

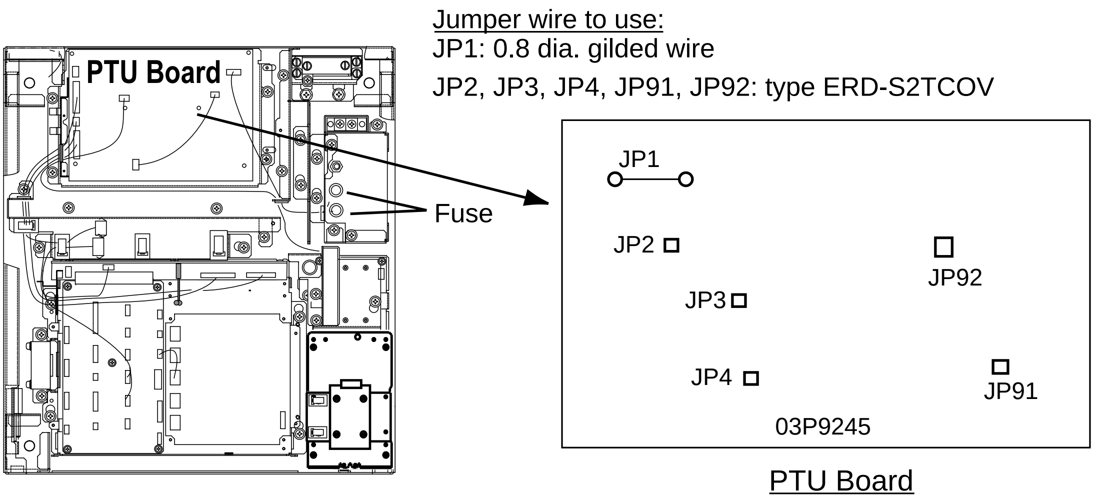


Figure 2-16 Processor unit, inside view

3. INITIALIZATION AND ADJUSTMENT

3.1 Tuning Initialization

Tune the radar as follows: Press [RADAR MENU] [0] [0] [2] [0] [0] [0] [0] (TUNE INITIALIZE on RADAR 3 menu) and press the [ENT] key. Also, confirm that "2.MODEL" is set to "FR-2115, 2125" on the INITIAL SETTING 4 menu, following paragraph 3.2 and then pressing [RADAR MENU], [0], [0], [0], [2], [0], [0], [0]. Trouble may result if the setting is wrong.

3.2 Accessing Menus for Initialization and Adjustment

1. Turn on the power.
2. Press the [RADAR MENU] key five times while pressing and holding down the [HL OFF] key.

3.2.1 Restoring default settings

1. Press [RADAR MENU] [0] [0] [0] [2] [0] [0] [0] to display the INITIAL SETTING 4 menu.
2. Press the [0] key to select FACTORY DEFAULT.
3. Press the [ENTER] key five times, and turn the power off and on again.
4. “Initializing” appears during restoring. It takes about 90 seconds to restore the default settings, after which the normal display appears. Confirm that "2.MODEL" is set to "FR-2115, 2125" on the INITIAL SETTING 4 menu.

3.3 Adjusting Video Signal Level

When the signal cable is very long, the video amplifier input level decreases, shrinking target echoes. To prevent this, confirm (and adjust if necessary) video amplifier input level.

1. Connect an oscilloscope to TP6 on the INT Board (03P9252) in the processor unit.
2. Transmit on the 12 nm range.
3. Adjust R21 on the INT Board so the value of TP6 is 4 Vpp. (For remote display, adjust R134 on the INT Board.)

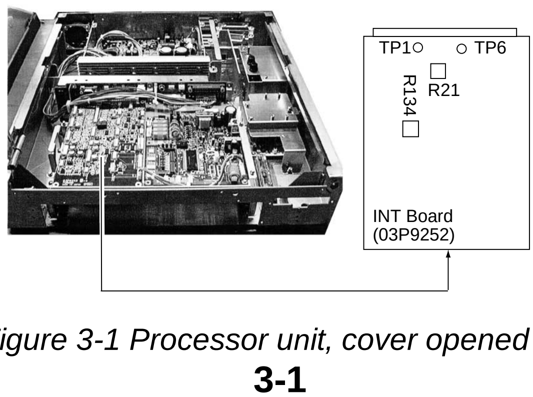


Figure 3-1 Processor unit, cover opened

3.4 Heading Alignment

You have mounted the antenna unit facing straight ahead in the direction of the bow. Therefore, a small but conspicuous target dead ahead visually should appear on the heading line (zero degrees).

In practice, you will probably observe some small bearing error on the display because of the difficulty in achieving accurate initial positioning of the antenna unit. The following adjustment will compensate for this error.

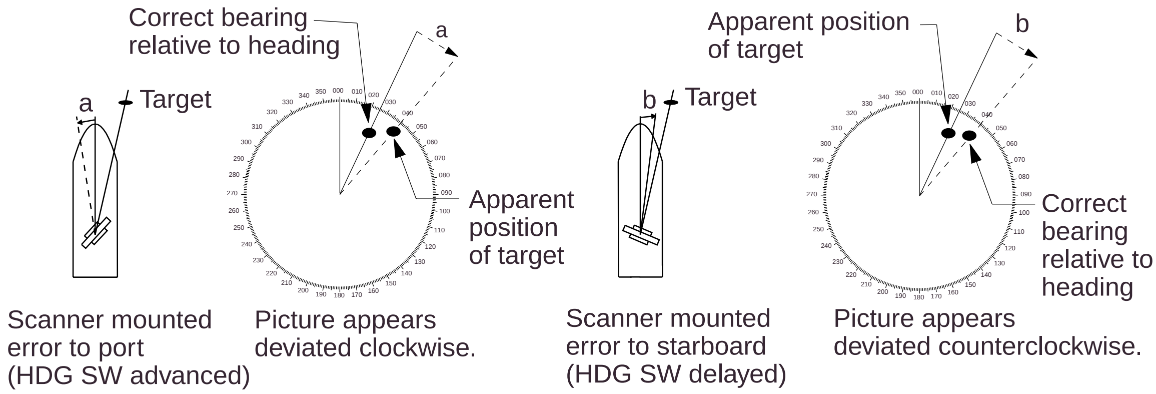


Figure 3-2 Heading alignment

1. Turn on the power. Press [RADAR MENU] [0] [0] [0] [2] [2] to select HL ALIGN on the INITIAL SETTING1 menu.
2. Select a target echo (by gyrocompass, for example) at a range between 0.125 and 0.25 nm, preferably near the heading line.
3. Operate the EBL control to bisect the target echo with the heading line. (The value shown on the display is scanner position in relation to ship's bow.)
4. Press [ENTER] to finish.

3.5 Adjusting Sweep Timing

Sweep timing differs with respect to the length of the signal cable between the antenna unit and the processor unit. Adjust sweep timing at installation to prevent the following symptoms:

- The echo of a "straight" target (for example, pier), on the 0.25 nm range, will appear on the display as being pulled inward or pushed outward. See Figure 3-3.
- The range of target echoes will also be incorrectly shown.

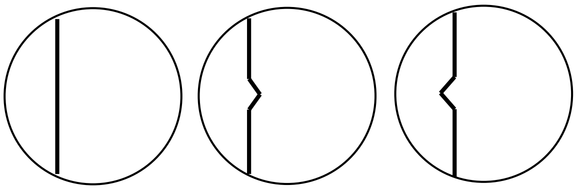


Figure 3-3 Examples of correct and incorrect sweep timings

1. Turn on the power. Press [RADAR MENU] [0] [0] [0] [2] [3] to select TIMING ADJ on the INITIAL SETTING1 menu.
2. Transmit on the 0.25 nm range.
3. Adjust radar picture controls to display picture properly.
4. Select a target echo which should be displayed straightly.
5. Adjust the VRM control to straighten the target echo.
6. Press [ENTER].

3.6 Suppressing Main Bang

If main bang appears at the screen center, suppress it as follows:

1. Turn on the power. Transmit on a long range and then wait ten minutes.
2. Adjust [GAIN] control to show a slight amount of noise on the display.
3. Select the 0.25 nm range. Adjust the [A/C SEA] control to suppress sea clutter.
4. Press [RADAR MENU] [0] [0] [0] [2] to open the INITIAL SETTING1 menu.
5. Press [7] to select 7. MBS.
6. Adjust the VRM control to adjust timing; the EBL control to adjust level.
7. Press [ENTER].

3.7 Confirming Magnetron Heater Voltage

Magnetron heater voltage is adjusted at the factory. However, confirm that it is within the prescribed rating.

Table 3-1 Magnetron heater voltage rating

Rating	FR-2115-B (12 kW)	FR-2125-B (25 kW)
ST-BY, 0.125 nm	7.4 to 7.6 V	8.2 to 8.4 V
TX, max range	7.4 to 7.6 V	6.5 to 7.5 V

1. Press [RADAR MENU] [0] [0] [0] [2] [0] to open the INITIAL SETTING2 menu.
2. Press [5] to select both the 5. SCANNER STOPPED field and the TX option and press [ENTER]. Disconnect connector P821 from the antenna unit.
3. Turn off screen brilliance.
4. Measure voltage between pins #12(+) and #5(-) on connector P801 on the RFC Board (03P9243) in the antenna unit.
5. If the voltage is not within the rating shown in Table 3-1, adjust potentiometer VR1 on the RFC Board.
6. Show the INITIAL SETTING 2 menu, press [5] to select ST-BY, and then press [ENTER].

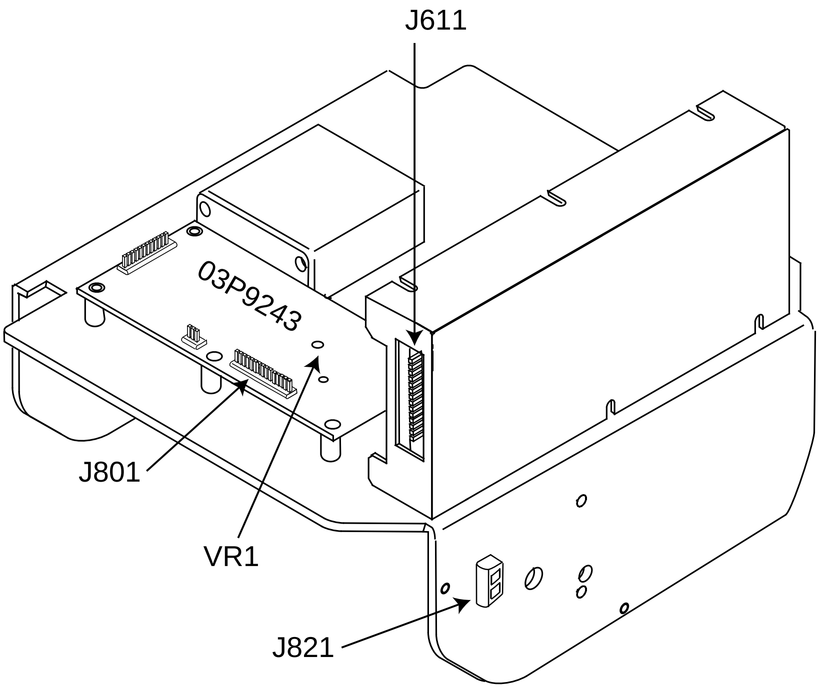


Figure 3-5 RFC Board

3.8 Initial Setting Menus

The INITIAL SETTING menus (four menus) and the OWN SHIP INFORMATION menu setup the radar according to expected usage, authorities specification, ship's characteristics, operator's preference, etc. Set items on each menu in accordance with regulations/operator's preference. After entering initial settings, reset the power.

Press [RADAR MENU] [0] [0] [0] [2]

[INITIAL SETTING 1]

1 [FUNCTIONS(4)]	
2 HL ALIGN	EBL 0.0°
3 TIMING ADJ	VRM 00.00
4 ANT HGT	5m/7m/10m/15m/ 20m/30m/MORE
5 LOG PULSE	200P/NM
6 [OWN SHIP INFORMATION]	
7 MBS	MBS TIMING VRM 0 MBS LEVEL EBL 0
8 ON TIME	000000.0H
9 TX TIME	000000.0H
0 [INITIAL SETTING(2)]	

Press [6]

[OWN SHIP INFORMATION]

1 [INITIAL SETTING(1)]	
2 SHIP'S LENGTH	000m
3 SHIP'S WIDTH	00m
4 RADAR POSN	FOR BOW 000m FOR PORT 00m
5 NAV ANT POSN	FOR BOW 000m FOR PORT 00m
6 TURN RATE	00KT 00.0° / s 00KT 00.0° / s
7 SPEED RATE	00KT 0.00KT/s 00KT 0.00KT/s

Press [0]

[INITIAL SETTING 2]

1 [INITIAL SETTING(1)]	
2 LOG GYRO INPUT	LOG PULSE/SERIAL DATA GYRO AD10/SERIAL DATA
3 OWN SHIP VECTOR	COMPASS/COURSE
4 KEY BEEP	ON/OFF
5 SCANNER STOPPED	ST-BY/TX
6 VIDEO SIG	ANALOG/DIGITAL
7 ALARM LEVEL	4/5/6/7
8 DISPLAY	MAIN/SUB
9 SECTOR BLKG	OFF/ON 000° → 000° 000° → 000°
0 [INITIAL SETTING(3)]	

Press [0]

[INITIAL SETTING 3]

1 [INITIAL SETTING(2)]	
2 TRAILS RESTART	OFF/ON
3 ECHO AVG W/O GYRO	OFF/ON
4 HEAD UP TB SCALE	DEG/16POINT
5 CTR ECHO STRETCH	OFF/ON
6 VIDEO CONTRAST	1/2/3
7 MAXIMUM RANGE	72/96/120
8 ECHO FULL COLOR *1	OFF/ON
9 INDEX LINES	2/3/6
0 [INITIAL SETTING(4)]	

Press [0]

[INITIAL SETTING 4]

1 [INITIAL SETTING(3)]	
2 MODEL	FR-2115, 2125/ OTHER X-BND/ FR-2165DS, 2135SW/ OTHER S-BND
3 TYPE	R/N/G/D
4 CTR STC CURVE	L/M/H
5 RJ-7	OFF/ON
6 RJ-8	OFF/ON ANT A FR-2115, 2125/ OTHER X-BND/ FR-2165DS, 2135SW/ OTHER S-BND ANT B FR-2115, 2125/ OTHER X-BND/ FR-2165DS, 2135SW/ OTHER S-BND
7 SHIP'S TYPE *1	DEEP SEA/FISHING/ LONG LINE FISHING
8 RANGE UNIT *1	NM/SM/km
9 CABLE LENGTH	500m/5000m
0 FACTORY DEFAULT *2	

*1: For merchant vessel the settings are DEEP SEA (SHIP'S TYPE), NM (RANGE UNIT), COLOR (ECHO FULL COLOR).
*2: For factory use.

INITIAL SETTING1 menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2]

HL ALIGN: Aligns heading.

TIMING ADJ: Adjusts sweep timing.

ANT HGT: Enter height of scanner above water. Select from 5 m, 7 m, 10 m, 15 m, 20 m, or more than 30 m.

LOG PULSE: Enter speed log's pulse rate.

OWN SHIP INFORMATION: Enter ship's characteristics; length, width, radar scanner position, navigation antenna position, turn rate, and speed rate. See the description on the next page for further details.

MBS: Suppresses main bang.

ON TIME, TX TIME: Shows number of hours the radar has been turned on and transmitted, respectively. Value can be changed.

INITIAL SETTING2 menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2] [0]

LOG GYRO INPUT: Select LOG or GYRO input type. LOG: Select pulse or serial data. GYRO: Digital from A/D converter or serial data.

OWN SHIP VECTOR: Select reference for own ship vector; compass or course.

KEY BEEP: Turns key response beep on or off.

SCANNER STOPPED: Set to ST-BY in normal use. TX enables transmission state without scanner rotation.

VIDEO SIG: Set to ANLG (analog) for normal use. Select DIGITAL to adjust QV (Quantized Video).

ALARM LEVEL: Sets echo strength which triggers guard alarm. "7" is strongest echo; "4" is medium strength echo.

DISPLAY: Select radar display function; main or sub (slave).

SECTOR BLKG: Sets area (up to 2) where no radar pulses will be transmitted. For example, set the area where an interfering object at the rear of the scanner would produce a dead sector (area where no echoes appear) on the display. To enter an area, select ON and enter relative bearing range of the area.

INITIAL SETTING3 menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2] [0] [0]

TRAILS RESTART: Selects whether to restart or discontinue target trails when changing the range. ON restarts trailing on newly selected range; OFF discontinues trails.

ECHO AVG W/O GYRO: Echo averaging can be turned on without gyrocompass connection.

HEAD UP TB SCALE: Bearing scale may be shown in degrees or compass points in the head-up mode.

CTR ECHO STRETCH: Turn on to enlarge echoes in the range up to the first range ring.

VIDEO CONTRAST: For factory use. Do not change setting.

MAXIMUM RANGE: For factory use. Do not change setting.

ECHO FULL COLOR: Echoes may be displayed in one color or multi-color. Select ON for multi-color display.

INDEX LINES: Selects the number of index lines to display; 2, 3, or 6.

INITIAL SETTING4 menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2] [0] [0] [0]

MODEL: Selects radar model.

TYPE: Selects specification of radar. R, Regular type; G, Germany; N, Netherlands, D, Denmark.

CTR STC CURVE: Selects level of STC affect; Low, Medium or High.

RJ-7, RJ-8: Selects which Interswitch unit to use.

SHIP'S TYPE: Select class of vessel; deep sea, fishing, long line fishing.

CABLE LENGTH: Set for "500."

FACTORY DEFAULT: Restores all menus' default settings.

OWN SHIP INFORMATION menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2] [6]

SHIP'S LENGTH: Enter ship's length.

SHIP'S WIDTH: Enter ship's width.

RADAR POSN: Enter distance from both bow and port to the radar antenna location.

NAV ANT POSN: Enter distance from both bow and port to the navigation antenna location.

TURN RATE: Enter ship's turn rate.

SPEED RATE: Enter ship's speed rate.

1. OPTIONAL EQUIPMENT

4.1 Gyro Converter GC-8

The Gyro Converter GC-8, incorporated inside the processor unit, converts analog gyrocompass reading into digital coded bearing data for display on the monitor.

This section explains how to install and the GC-8 (mainly consisting of the GYRO CONVERTER Board) and set it up according to the gyrocompass connected.

4.1.1 Installation and connection of the GYRO CONVERTER Board

Necessary Parts: GC-8 (Code No. 008-446-520)

Name	Type	Qty	Code No.
Gyro Converter Board	64P1106	1	004-412-226
Washer-head Screw	M3X8, C2700W	5	000-881-404
Sticker	64-014-20211	1	100-132-701

1. Turn off the main POWER switch.
2. Open the processor unit. Turn off the internal power switch if so equipped. Unfasten four screws to remove the INT Board cover.
3. Fasten the GYRO CONVERTER Board inside the processor unit with four washer-head screws (supplied).

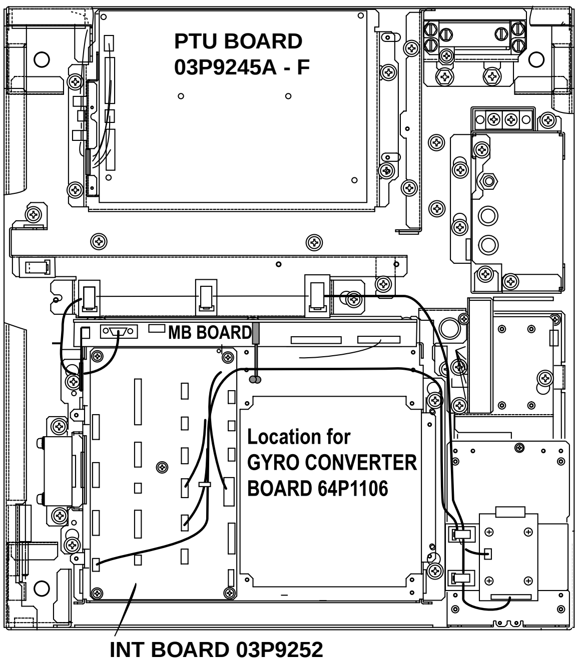


Figure 4-1 Processor unit, inside view, INT board cover removed

4. Connect the GYRO CONVERTER Board to the INT Board (cables supplied with GC-8) as shown below.

INT Board		GYRO CONVERTER Board
J446 (4P)	↔	J7 (5P)
J465 (6P)	↔	J1 (14P)

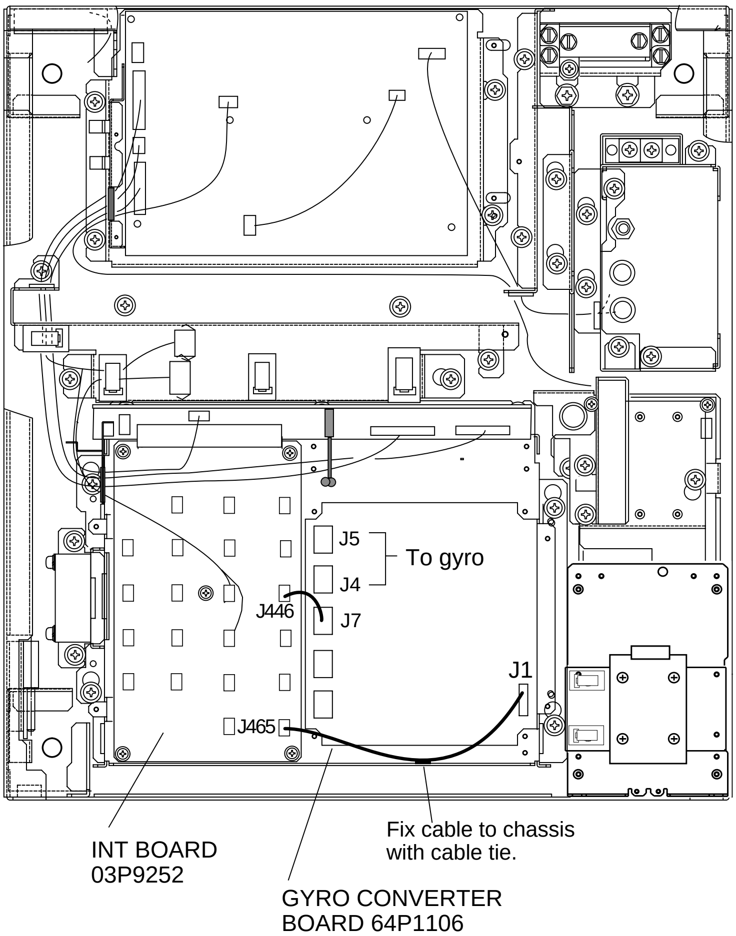


Figure 4-2 Processor unit, inside view

5. Confirm gyrocompass specifications and set the DIP switches and jumper wires on the GYRO CONVERTER Board according to the gyrocompass connected:
   Setting jumper wires and DIP switches by gyrocompass specifications: page 4-4
   Setting jumper wires and DIP switches by make and model of gyrocompass: page 4-5
   Location of jumper wires and DIP switches: page 4-6
6. Solder the gyrocompass cable to the VH connector assemblies (supplied).
7. Attach instruction label (supplied) to shield cover for the INT and GYRO CONVERTER boards.
8. Close both the INT Board cover and the processor unit cover.
9. Turn the power off and on again to reset the CPU.

4.1.2 Connection of external power supply

An external power supply is necessary when the repeater signal is step-by-step type and the step voltage is below 20 V or output voltage is less than 5 W.

1. Cut the jumper wire JP1 on the GYRO CONVERTER Board when an external power supply is used.
2. Connect the gyro cable and power cable as shown below.

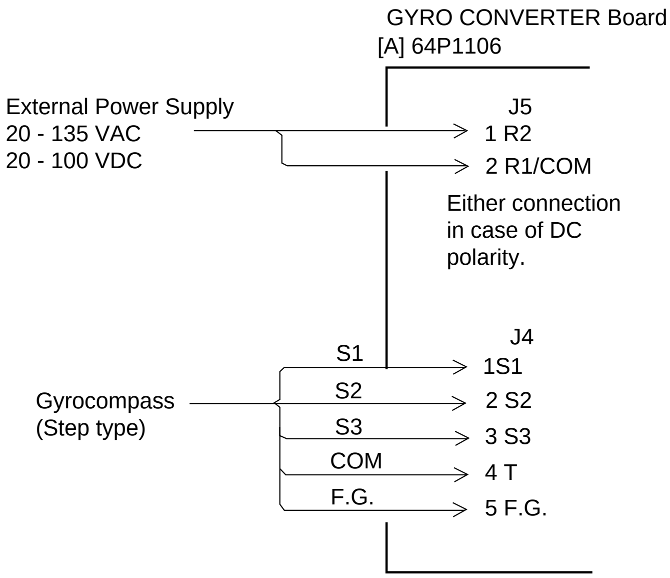


Figure 4-3 Connection of external power supply to GYRO CONVERTER Board

4.1.3 DIP switch, jumper wire settings

Default setting

The default setting of all DIP switches is off and all jumpers wire are set to "#1". (Note that the jumper wire JP1 is set at #1, #2, and #3.) In those settings the gyrocompass having the following characteristics can be directly connected; modification of the GYRO CONVERTER Board is not necessary.

AC synchronous signal: 50/60 Hz
Rotor voltage: 60 to 135 V AC
Stator voltage: 60 to 135 V AC
Gear ratio: 360X
Supply voltage: 30 to 135 V AC

If the specifications of the gyrocompass differ from those mentioned above, change jumper wire and DIP switch settings on the GYRO CONVERTER Board as appropriate. Settings may be changed according to gyrocompass specifications (page 4-4) or make and model of gyrocompass (page 4-5). For the location of DIP switches and jumper wires, see page 4-6.

Setting method 1: DIP switch settings and gyrocompass specifications

1) Gyrocompass type

Gyrocompass type	SW 1-4	SW 1-5	SW 1-6	JP1
AC synchronous	OFF	OFF	OFF	#1, #2, #3
DC synchronous	OFF	OFF	OFF	#2, #3, #4
DC step	ON	OFF	OFF	#4, #5, #6
Full-wave pulsating current	OFF	ON	0FF	#4, #5, #6
Half-wave pulsating current	ON,	ON	OFF	#4, #5, #6

2) Frequency

Frequency	SW 1-7	SW 1-8	Remarks
50/60 Hz	OFF	OFF	AC synchronous pulsating current
400 Hz	ON	OFF	AC synchronous pulsating current
500 Hz	OFF	ON	AC synchronous pulsating current
DC	ON	ON	DC synchronous DC step

3) Rotor Voltage (between R1 & R2)

Rotor Voltage	SW 2-1	JP3
20 to 45 VAC	ON	#2
30 to 70 VAC	OFF	#2
40 to 90 VAC	ON	#1
60 to 135 VAC	OFF	#1

4) Stator Voltage (between S1 & S2)

Stator Voltage	SW 2-2	SW 2-3	JP2
20 to 45 VAC, or 20 to 60 VDC	OFF	OFF	#2
30 to 70 VAC, or 40 to 100 VDC	ON	OFF	#2
40 to 90 VAC	OFF	ON	#1
60 to 135 VAC	ON	ON	#1

5) Ratio

Ratio	SW 1-1	SW 1-2	SW 1-3
360X	OFF	OFF	OFF
180X	ON	OFF	OFF
90X	OFF	ON	OFF
36X	OFF	ON	OFF

6) Supply Voltage

Stator Voltage	SW 2-2	SW 2-3	JP2
20 to 45 VAC, or 20 to 60 VDC	OFF	OFF	#2
30 to 70 VAC, or 40 to 100 VDC	ON	OFF	#2
40 to 90 VAC	OFF	ON	#1
60 to 135 VAC	ON	ON	#1

7) AD-10 format data Tx interval

Select data transmitting interval for ports 1 to 6 with jumper wires JP6 and JP7. The Tx interval is available in 25 ms or 200 ms. 25 ms is for radar: 200 ms is for all other equipment.

8) NMEA interval

Tx Interval	SW2-4
2 seconds	ON
1second	OFF

Setting method 2: DIP switch/jumper settings and make and model of gyrocompass

Maker	Models	Specification	SW 1-1	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8	SW 2-1	SW 2-2	SW 2-3	JP1	JP2	JP3	JP4	JP5
FURUNO	GY-700	DC step 100V 180x 5-wire, open collector	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1
Anschutz	Standard 2,3	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#
	Standard 4,6	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#1	#1	#
	Standard 20	DC step 35V 180x COM(-) ,3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#
Yokogawa Navtec (Plaith type)	C-1/1A/2/3 A-55, B-55	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#
	CMZ-700	DC step 24V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	Remo- ve	#2	-	*	*
	CMZ-250X/ 300X/500	DC synchronous 360x	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	-	ON	OFF	Remo- ve	#2	-	*	*
		DC step 35V 180x COM(+),3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2
	CMZ-100/200/ 300 C-1Jr,D-1Z/1/3 IPS-2/3	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	CMZ-50 Note	step 35V 180x COM(+),3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	Remo- ve	#2	-	*	*
Plaith	NAVGAT II/III	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 68V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#2	#1	#1
Tokimec (Sperry type)	ES-1/2/11 GLT-101/102/ 103/106K/107	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 36x	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	ES-11A/110 TG-200 PR222R/2000 PR237L/H GM 21	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 22V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	MK-14 MOD-1/2/T NK-EN,NK-EI	DC step 70V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1
	SR-130/140	DC step 70V 180x 5-wire, open collector	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1
	TG-100/5000 PR-357/130/ 140, ES-17 GLT-201/202 /203	DC step 70V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1
	TG-6000	DC step 24V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2
	GM-11	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	SR-120,ES-16 MK-10/20/30	DC step 35V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2
Kawasaki	GX-81	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
Armabrown	MK-10,MKL-1 SERIES1351, MOD-4	DC step 50V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1
Robertson	SKR-80	DC step 35V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2

*: Set JP4 and JP5 according to the voltage of the external power supply.

Note: If CMZ-50 has 35VDC, set JP1 to #4, #5, #6.

Location of DIP switches, jumper wires on the GYRO CONVERTER Board

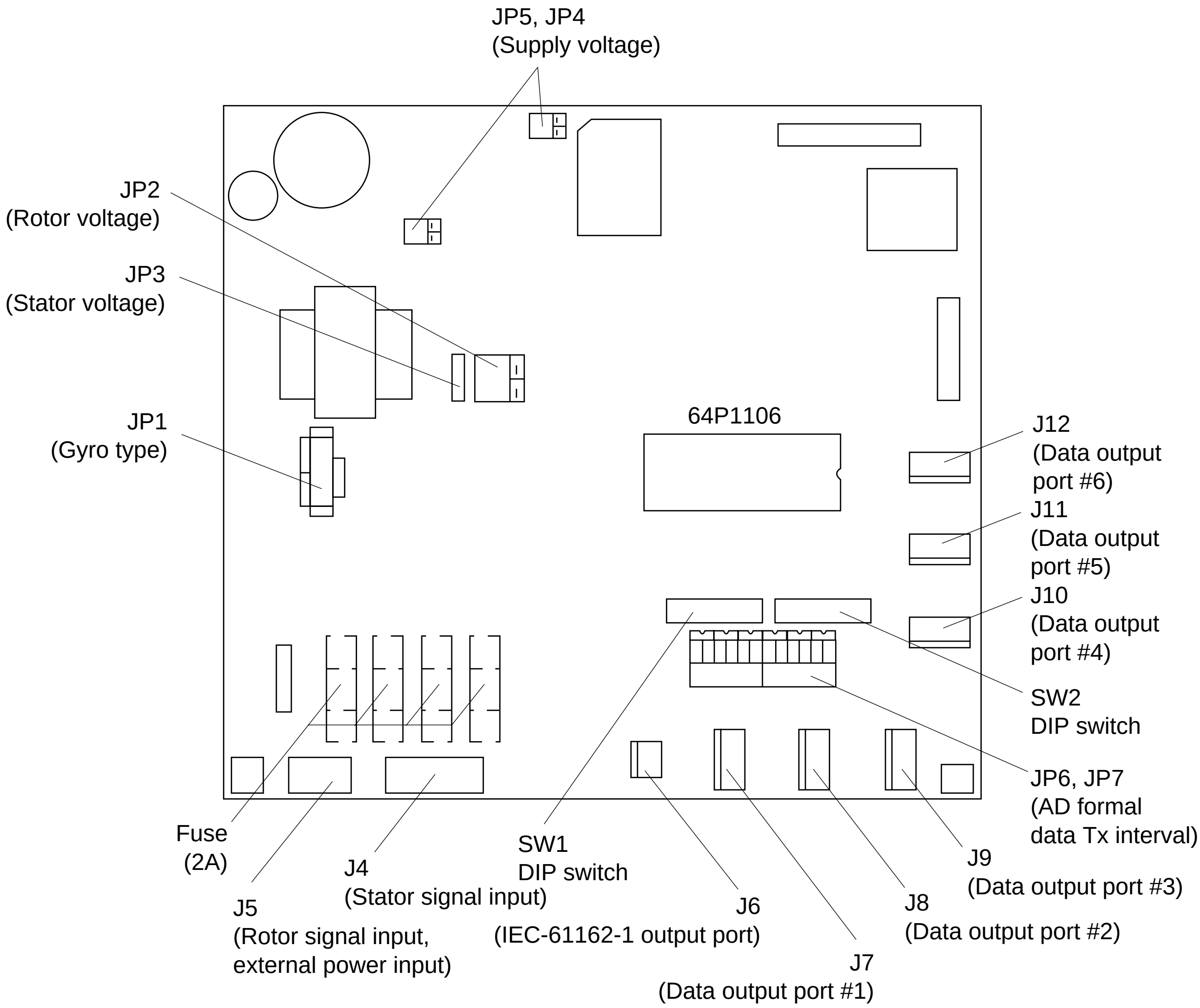


Figure 4-4 GYRO CONVERTER Board

4.1.3 Setting the heading readout on the radar display

Confirm that the gyrocompass is giving a reliable readout. Then, set the heading readout on the monitor as follows:

1. Press the [RADAR MENU] key to display the FUNCTIONS 1 menu.
2. Press the [0] key twice to display the FUNCTIONS 3 menu.
3. Press the [9] key to select the GYRO SETTING option.
4. Rotate the EBL control to align the radar's HDG readout with the gyrocompass heading.
5. Press the [ENTER] key to finish.

4.2 ARP Board ARP-26

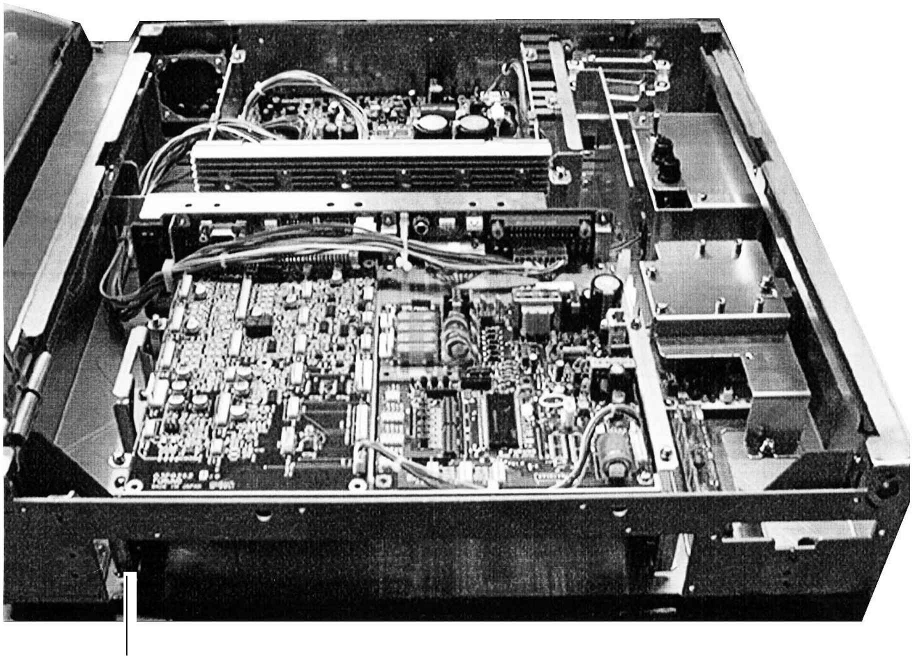
The ARP Board ARP-26, which provides ARPA functions, is an optional circuit board which is accommodated in the processor unit. Note that the ARP-26 is not available with the statute mile-type radar.

Necessary Parts: ARP-26-2E (008-485-500)

Name	Type	Qty	Code No.
ARP Board	18P9002B	1	008-473-650

4.2.1 Installation of the ARP board

1. Turn off the power. Unfasten the PCB card case cover at the left front of the processor unit by unfastening four screws.
2. Set the ARP Board in the center slot of the PCB card case.



Top: RP Board (Option)
Middle: ARP Board (Option)
Bottom: SPU Board

Figure 4-5 Processor unit, inside view

3. Adjust the ARP Board referring to the procedure on the next page.

4.2.2 ARP board adjustment

1. Turn the GAIN, A/C SEA and A/C RAIN controls fully counterclockwise (OFF). Transmit on the 12 nm range.
2. Connect a digital multimeter between TP7(+) and TP6(-) on the ARP Board.

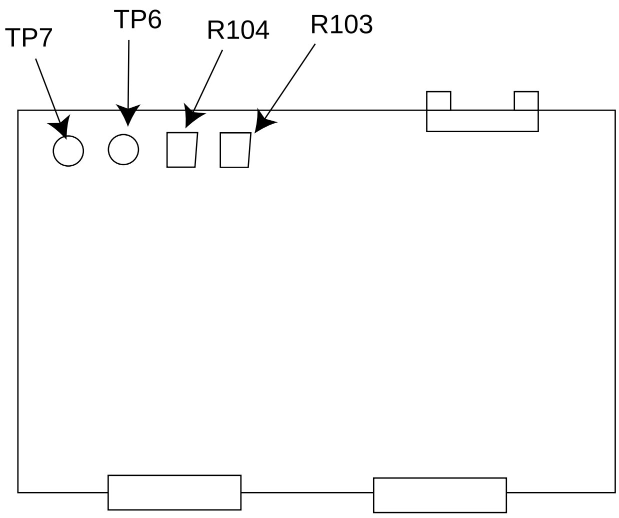


Figure 4-6 ARP Board (18P9002B)

3. Adjust R104 on the ARP Board so the multimeter reads between 0.09 and 0.14 VDC.
4. Set controls and switches as below.
5. GAIN: fully clockwise (max.)
   Interference rejector: OFF
   Range: 24 nm
   Echo stretch: OFF
6. Press [RADAR MENU] [0] [0] [0] [2] [0] to open the INITIAL SETTING2 menu.
7. Set the VIDEO SIG field to DIGITAL and press the [ENTER] key.
8. Adjust R103 on the ARP Board so noise just appears on the display.

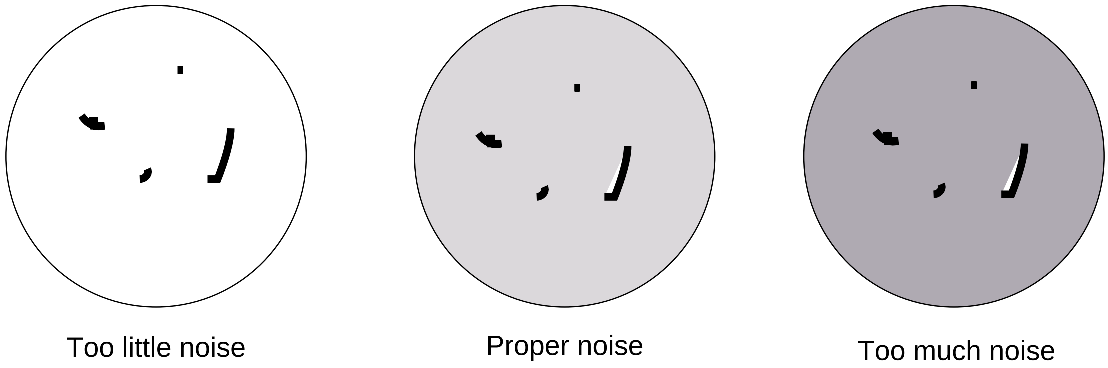


Figure 4-7 How to adjust noise

9. Set VIDEO SIG to ANALOG and press the [ENTER] key.

4.2.3 Final check of ARP board

Connect a gyrocompass and a log to the radar and place the radar under transmit state. Confirm that LEDs CR9, CR10, CR11, CR12, CR15 and CR16 on the ARP Board are off. If ship's speed is zero, or other signal is not being input, corresponding LED will light. Refasten the card case cover and close the processor unit.

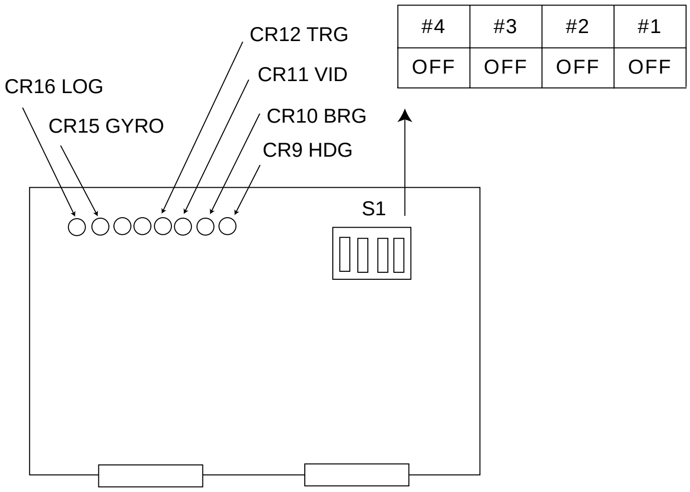


Figure 4-8 ARP Board (18P9002B)

4.3 RP Board RP-26

The RP Board RP-26, which provides video plotter functions, consists of a circuit board and a card drive, both of which are accommodated in the processor unit. Note that the RP-26 is not available with the statute mile-type radar.

Necessary parts: RP-26-Z-2E (Code no. 008-485-520)

Name	Type	Qty	Code No.	Remarks
M-card Base Assy.	–	1		IF Board, Cable assy., M-card base assy.
RP Board	14P0298	1	008-487-640	
Pan-head Screw B	M4X8 C2700W	4	000-881-445	
Pan-head Screw B	M3X8 C2700W	2	000-881-404	Not used
Pan-head Screw A	M2.6X5 C2700W	2	000-800-973	Not used
Pan-head Screw A	M3X8 C2700W	1	000-881-104	Not used
Teethed Lock Washer	M4 C5191W	1	000-864-506	
Teethed Lock Washer	M4 C5191W	1	000-864-504	Not used

1. Open the processor unit. Unfasten one M4X8 pan-head screw and two M3X10 pan-head screws to remove the RGB Board together with its mounting plate. Disconnect the monitor cable at the RGB Board. See the figure at the top of the next page for location.

2. Unfasten four M3X8 pan-head screws to remove the RP board mountlng plate from the RGB board and its mounting plate.

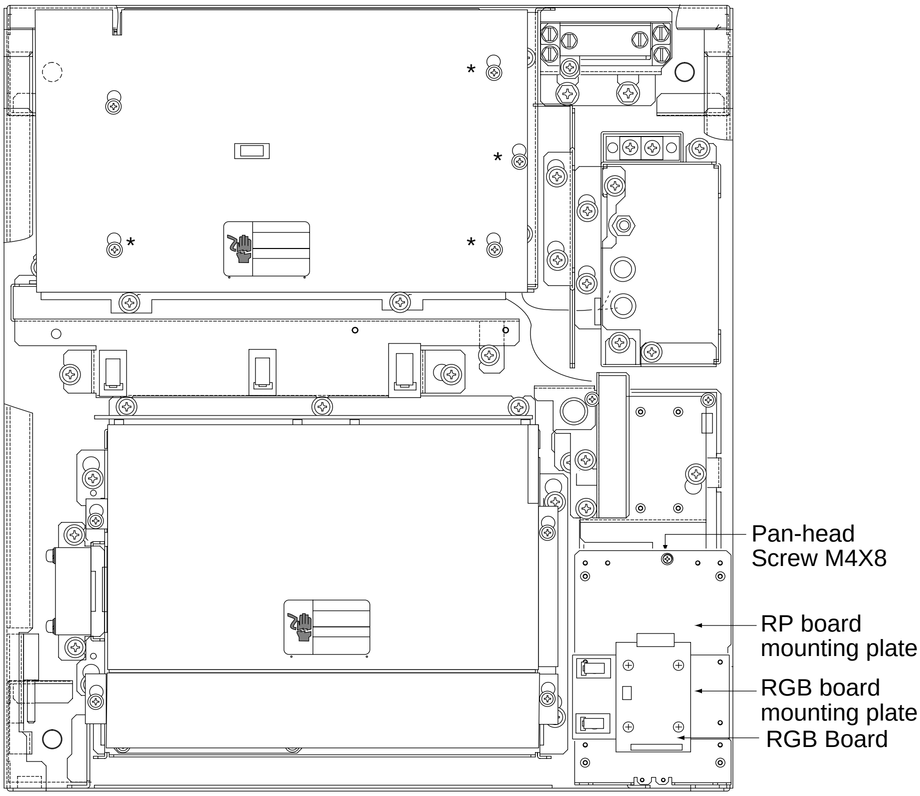


Figure 4-9 Processor unit, inside view

3. Disconnect RP connector from M-card base assy. Fasten the M-card base assy. and RGB board mounting plate with one M4X8 pan-head screw.

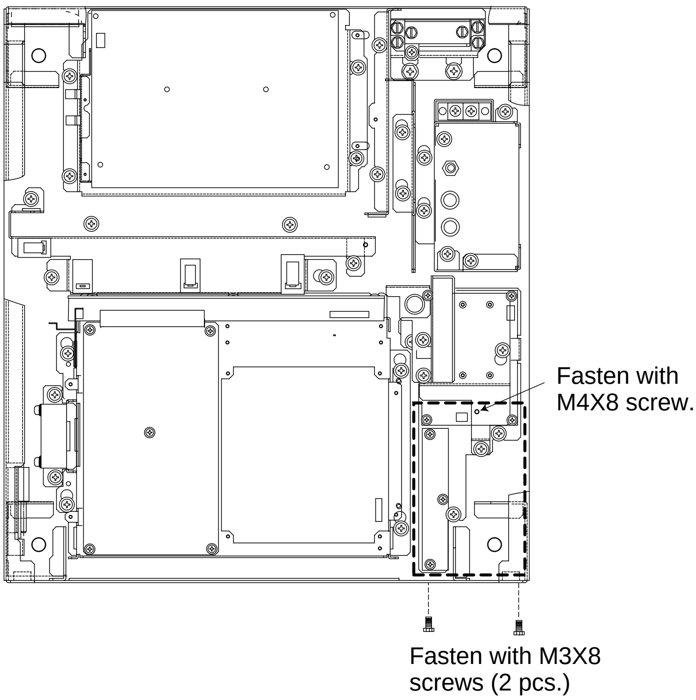


Figure 4-10 Processor unit, inside view

4. Fix the M-card base assy. with two M3X8 pan-head screws.
5. Set the M-card case cover to the hole in the front panel and fix with two M2.6X5 pan-head screws.

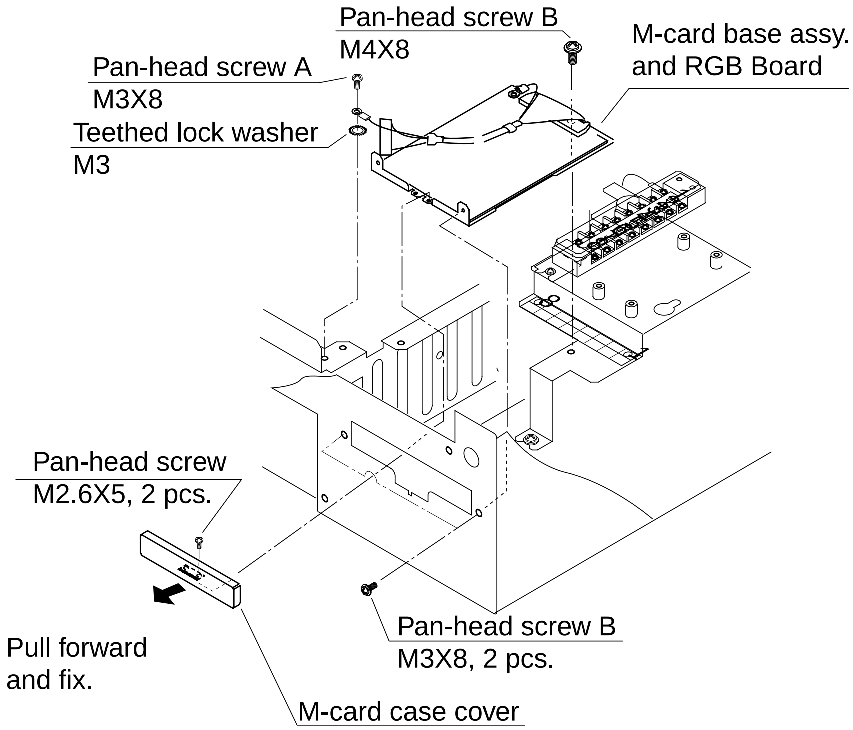
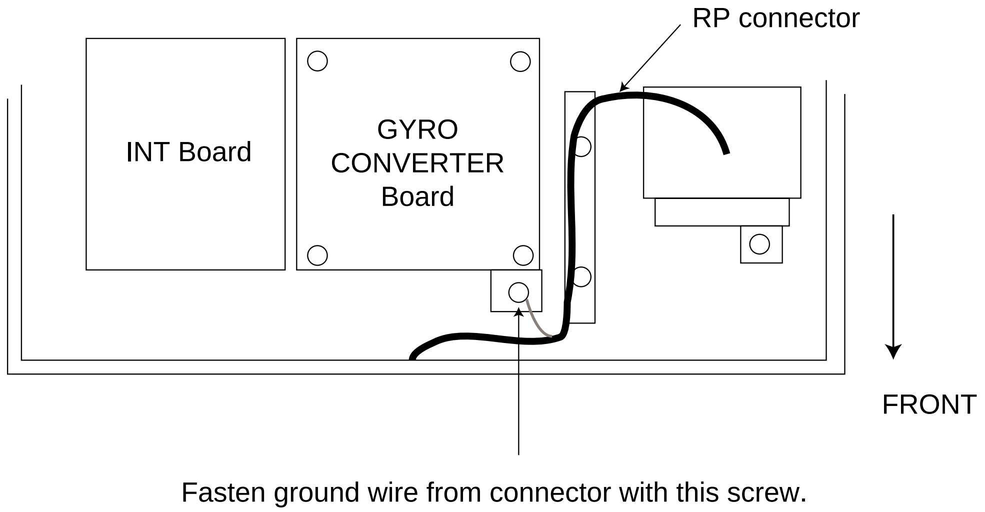


Figure 4-11 Processor unit, front view

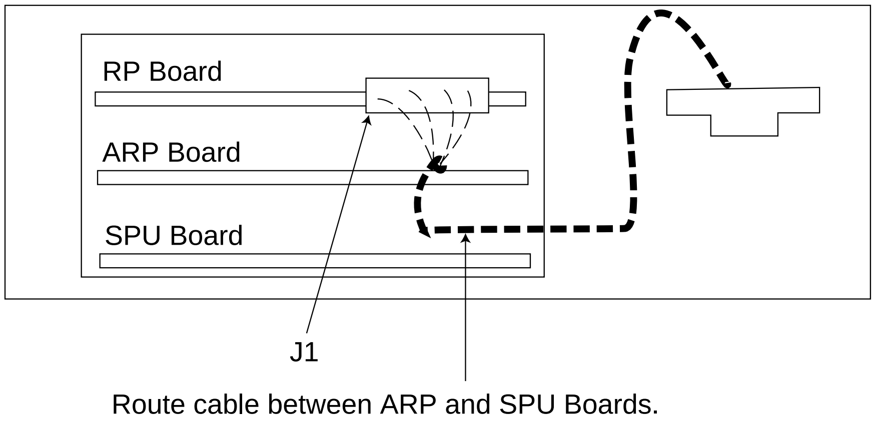
6. Unfasten four M4X8 screws to remove the PCB card case cover at the front of the processor unit.
7. Set the RP Board (14P0298) in the top slot of the PCB card case.

8. Run the connector from the card case in front of the GYRO CONVERTER Board as shown in Figure 4-12.

9. Plug the connector from the M-card base assy. in J1 on the RP Board as shown in Figure 4-12.



(TOP VIEW)



(FRONT VIEW)

Figure 4-12 Processor, front and top views

10. Fasten the ground wire from the connector with M3X8 pan-head screw and teethed lock washer at the location shown in Figure 4-12.

11. Fasten the PCB card case cover to the processor unit.

12. Connect the monitor cable to the RGB Board. Close the processor unit.

4.4 Performance Monitor PM-30

Necessary parts: PM-30 and OP03-150 (Code no. 008-485-490)

Name	Type	Code No.	Qty
PM-IN Board	03P9225	008-487-620	1
Pan-head Screw B	M3X8 C2700W	000-881-404	3
Connector Assy.	VH3P-L300-AA	000-141-014	2

1. Open the processor unit. Unfasten three screws to remove the RGB Board together with its mounting plate. Unfasten the monitor cable at the RGB Board. (See Figure 4-9 on page 4-10 for location.)
2. Fasten the PM Board 03P9225 to the location shown below with three M3X8 pan-head screws.

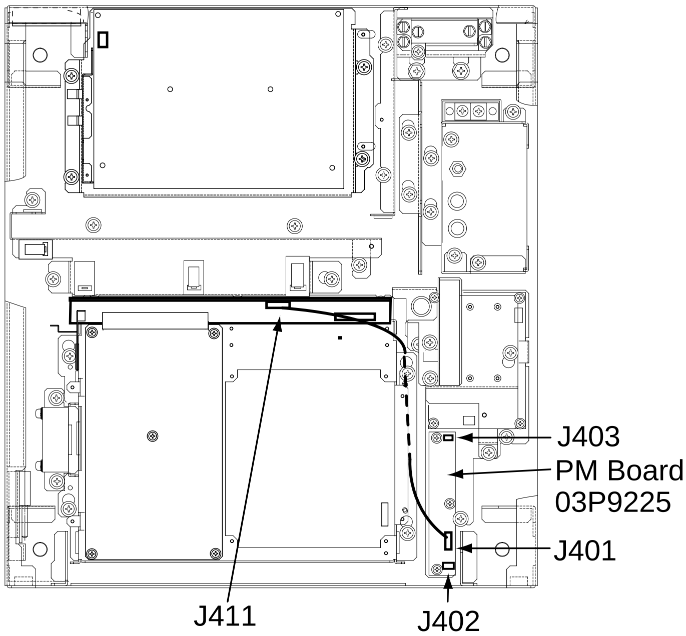


Figure 4-13 Processor unit, inside view

3. Connect J411 to J401 on the PM Board.
4. Connect two connector assemblies (VH3P-L300-AA) to J402 and J403.
5. Solder the other end of the connector assemblies with external cables, one from ship's mains and one from the PM-30.
6. Fasten the RBG board and its mounting plate and connect the monitor cable. Close the processor unit.

4.5 Alarm Kit

The alarm kit mainly consists of a circuit board and connection cables, and provides alarm output to ship's bridge alarm system.

Necessary parts: OP03-156 (Code no. 008-500-650)

Name	Type	Code No.	Qty
ALARM Board	03P9262	008-500-680	1
NH Connector Assy.	03-1990(9-9P)	008-500-700	1
NH Connector Assy.	03-1991(3P)	008-500-710	4
Cable Band	HP-3N	000-570-001	1
Cable Tie	CV-100	000-570-322	3
Pan-head Screw B	M3X8 C2700W	000-881-404	4
Pan-Head Screw B	M3X8 C2700W	000-881-447	1

Refer to the figure on the next page for parts location.

1. Open the processor unit.
2. Unfasten four screws to dismount the INT Board cover.
3. Fasten the ALARM Board to the processor unit with four M3X8 pan-head screws (supplied).
4. Connect the NH connector (9-9P, supplied) between J471 on the ALARM Board and J451 (EXT-BUZ) on the INT Board, passing it through the cable band and binding it with existing cable tie.
5. Fasten the cable band (supplied) with a pan-head screw (M4X12, supplied) and attach two cable ties (CV-100, supplied).
6. Connect a NH connector (3P, supplied) to each of J472, J473, J474 and J475 on the ALARM Board.
7. Route the NH connectors along the cable ties and pass them through the cable clamp.
8. Close the INT board cover.
9. Close the processor unit.

J472: ARPA guard zone; target alarm

J473: SYSTEM FAILURE (HP, BP, TRIG, VIDEO, GYRO, and AZI)

J474: ARPA CPA/TCPA

J475: Spare

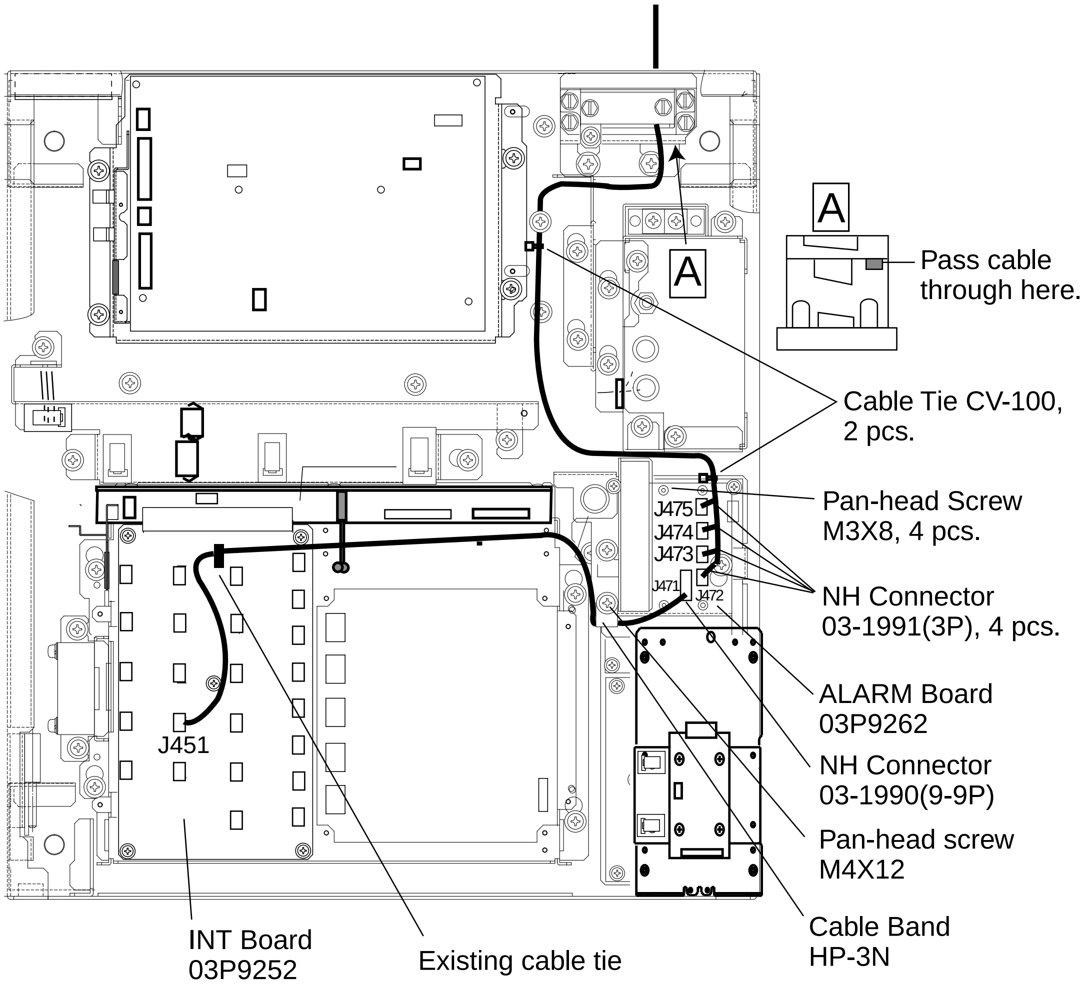


Figure 4-14 Processor unit, inside view

4.6 AC-DC Conversion Kit

The AC-DC Conversion Kit enables conversion from AC power to DC power, and mainly consists of a circuit board and filter.

AC-DC Conversion Kit (for 24 rpm antenna) Type: OP03-161-24, Code No. 008-499-760				AC-DC Conversion Kit (for 42 rpm antenna) Type: OP03-161-42, Code No. 008-499-770			
Name	**Type**	**Code No.**	**Qty**	**Name**	**Type**	**Code No.**	**Qty**
POWER Board	03P9246A	008-487-440	1	POWER Board	03P9246C	008-493-700	1
Filter	RDP-124 (DC)	008-492-460	1	Filter	RDP-124 (DC)	008-492-460	1

1. Open the processor unit.
2. Follow a) and b) of "how to access rear-left fixing hole" on page 7 to remove the PTU Board cover.
3. Unplug all connectors from the PTU Board.
4. Loosen the screws fixing the PTU Board, and then remove the PTU Board.
5. Fasten new PTU Board with screws removed in step 4.
6. Plug in six connectors to their proper locations on the PTU Board. Do not connect J101.
7. Loosen four screws fixing the AC filter.
8. Fasten new filter.
9. Connect cable from filter to J101 on the PTU Board.
10. Fasten the PTU board cover.
11. Connect power cable from ship's mains.
12. Close the processor unit.

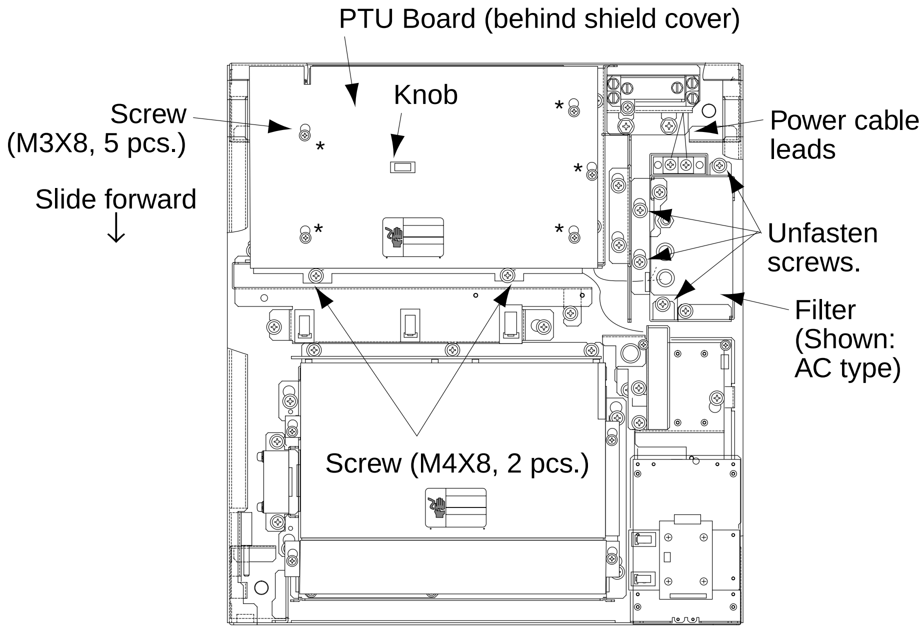


Figure 4-15 Processor unit, inside view

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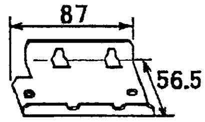
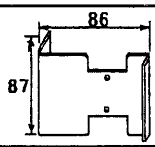
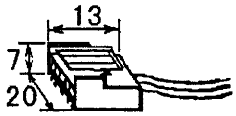
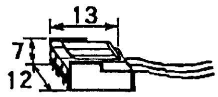
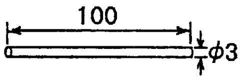
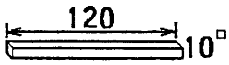
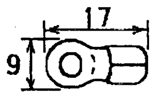
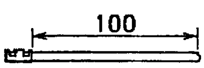
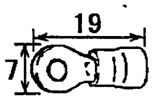
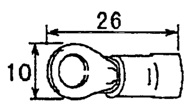
CODE NO.	008-503-450	03FS-X-9408 -1
TYPE	CP03-19105	1/2

工事材料表

INSTALLATION MATERIALS

FR-2115/2115-B
FR-2125/2125V
FR-2125W/2125-B
FR-2135S/2135SW
FR-2135S-B/2165DS
FR-2155/2155-B
FR-2135SW-MSA

船舶用レーダー
MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	下クランプ前板 LOWER CLAMP FRONT PLATE		03-144-1425-1 CODE NO. 100-263-601	1	
2	下クランプ後板 LOWER CLAMP REAR PLATE		03-144-1426-0 CODE NO. 100-263-610	1	
3	VHコネクタ組品 VH CONNECTOR ASSY.		03-1737(5P) CODE NO. 008-454-380	1	
4	VHコネクタ組品 VH CONNECTOR ASSY.		03-1738(3P) CODE NO. 008-454-390	1	
5	スミチューブF(Z) HEAT-SHRINK TUBE		3X0.25 クロ ＊0.10M＊ CODE NO. 000-105-874	2	
6	シールドフォーム SHIELD FOAM		71TS-10-10＊0.12M＊ CODE NO. 000-808-456	4	
7	圧着端子 CRIMP-ON LUG		8NK4 CODE NO. 000-538-180	2	
8	NHコネクタ ＊センザイ＊ NH CONNECTOR ASSY.		AWG24 ＊0.1M＊ CODE NO. 000-132-342	20	
9	圧着端子 CRIMP-ON LUG		FV1.25-M3 アカ CODE NO. 000-538-110	5	
10	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	2	

DWG NO.
C3464-M07- B

FURUNO ELECTRIC CO., LTD.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-503-450	03FS-X-9408-1
TYPE	CP03-19105	2/2

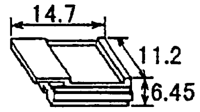
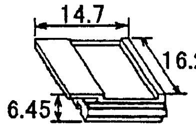
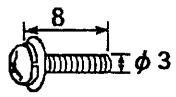
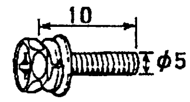
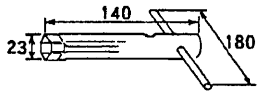
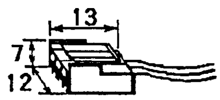
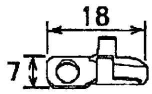
工事材料表

INSTALLATION MATERIALS

FR-2115/2115-B
FR-2125/2125V
FR-2125W/2125-B
FR-2135S/2135SW
FR-2135S-B/2165DS
FR-2155/2155-B
FR-2135SW-MSA

船舶用ﾚｰﾀﾞｰ

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	ｺﾈｸﾀ CONNECTOR		H3P-SHF-AA CODE NO. 000-505-596	2	
12	ｺﾈｸﾀ CONNECTOR		H5P-SHF-AA CODE NO. 000-505-598	2	
13	+-ﾅﾍﾞ ｾﾑｽﾈｼﾞ B WASHER HEAD SCREW		M3X8 C2700 MBNI2 CODE NO. 000-881-404	2	
14	+ｱﾌﾟ ｾｯﾄUIｾﾑｽB +HEX.BOLT (WASHER HEAD)		M5X10 SUS304 CODE NO. 000-802-288	2	
15	ﾊﾟｲﾌﾟﾎﾞｯｸｽPS PIPE BOX SPANNER		PS0017 CODE NO. 000-830-140	1	
16	ｺﾈｸﾀ(ｸﾐﾋﾝ) CONNECTOR ASSY.		VH3P-L300-AA CODE NO. 000-141-014	2	
17	特殊ﾗｸﾞ LUG		ｱﾅｹｲ4 ｽｽﾞ CODE NO. 000-536-100	2	

DWG NO.
C3464-M08- B

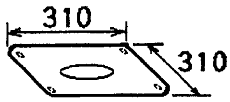
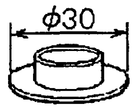
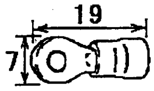
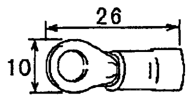
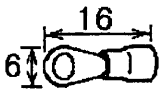
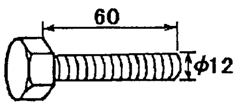
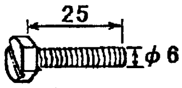
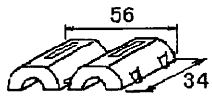
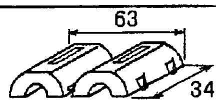
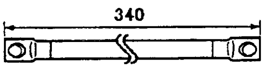
FURUNO ELECTRIC CO., LTD.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-493-160	03FS-X-9404 -7
TYPE	CP03-19104	1/2

工事材料表
INSTALLATION MATERIALS

番号 NO.	名　称 NAME	略　図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	防蝕ゴム.1. CORROSION-PROOF RUBBER MAT		03-001-3001-0 CODE NO.	 300-130-010	1	空中線部用 FOR ANTENNA UNIT
2	ｼｰﾙﾜｯｼｬ SEAL WASHER		03-001-3002-0 CODE NO.	 300-130-020	4	空中線部用 FOR ANTENNA UNIT
3	圧着端子 CRIMP-ON LUG		FV1.25-M3 ｱｶ CODE NO.	 000-538-110	26	空中線部用 FOR ANTENNA UNIT
4	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO.	 000-538-123	2	空中線部用 FOR ANTENNA UNIT
5	圧着端子 CRIMP-ON LUG		FVD1.25-3 CODE NO.	 000-116-634	1	空中線部用 FOR ANTENNA UNIT
6	六角ﾎﾞﾙﾄ（全ﾈｼﾞ） HEX. BOLT		M12X60 SUS304 CODE NO.	 000-862-191	4	空中線部用 FOR ANTENNA UNIT
7	六角ﾎﾞﾙﾄ HEX.BOLT		M6X25 SUS304 CODE NO.	 000-862-180	1	空中線部用 FOR ANTENNA UNIT
8	EMIｺｱ EMI CORE		RFC-10 CODE NO.	 000-141-085	2	空中線部用 FOR ANTENNA UNIT
9	EMIｺｱ EMI CORE		RFC-13 CODE NO.	 000-141-084	2	空中線部用 FOR ANTENNA UNIT
10	ｱｰｽ線 GROUNDING WIRE		RW-4747-1 03S4747 CODE NO.	 000-566-000	1	空中線部用 FOR ANTENNA UNIT

DWG NO.
C3464-M05- G

FURUNO ELECTRIC CO ., LTD.

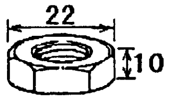
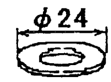
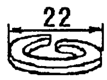
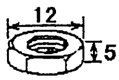
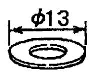
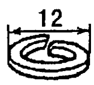
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-493-160	03FS-X-9404 -7
TYPE	CP03-19104	2/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	六角ﾅｯﾄ 1種 HEX. NUT		M12 SUS304 CODE NO. 000-863-112	4	空中線部用 FOR ANTENNA UNIT
12	ﾐｶﾞｷ平座金 FLAT WASHER		M12 SUS304 CODE NO. 000-864-132	4	空中線部用 FOR ANTENNA UNIT
13	ﾊﾞﾈ座金 SPRING WASHER		M12 SUS304 CODE NO. 000-864-263	4	空中線部用 FOR ANTENNA UNIT
14	六角ﾅｯﾄ 1種 HEX. NUT		M6 SUS304 CODE NO. 000-863-109	1	空中線部用 FOR ANTENNA UNIT
15	ﾐｶﾞｷ平座金 FLAT WASHER		M6 SUS304 CODE NO. 000-864-129	3	空中線部用 FOR ANTENNA UNIT
16	ﾊﾞﾈ座金 SPRING WASHER		M6 SUS304 CODE NO. 000-864-260	1	空中線部用 FOR ANTENNA UNIT

DWG NO. C3464-M06- G

FURUNO ELECTRIC CO ., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.		03FS-X-9405 -1
TYPE		1/1

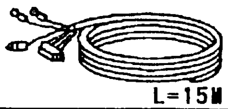
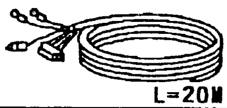
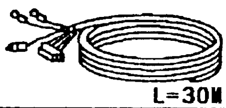
工事材料表

INSTALLATION MATERIALS

FR-2125V
FR-2115-B
FR-2125-B

船舶用レーダ

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=15M	S03-75-15 CODE NO. 008-485-400	1	選択 TO BE SELECTED
2	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=20M	S03-75-20 CODE NO. 008-485-410	1	選択 TO BE SELECTED
3	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=30M	S03-75-30 CODE NO. 008-485-420	1	選択 TO BE SELECTED

DWG NO. C3471-M01- B

FURUNO ELECTRIC CO ., LTD

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.		03FS-X-9406 -1
TYPE		1/1

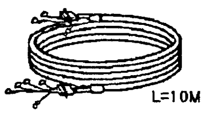
工事材料表

INSTALLATION MATERIALS

FR-2115-B
FR-2125-B
FR-2155-B
FR-2135S-B

船舶用ﾚｰﾀﾞｰ

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	ｹｰﾌﾞﾙ(ｸﾐﾋﾝ) CABLE ASSY.	 L=10M	UL1007/2C-2VSB		1	
			CODE NO.	000-142-172		

DWG NO.
C3483-M01- B

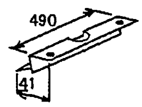
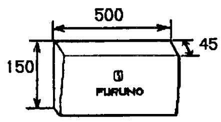
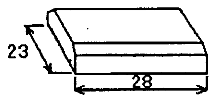
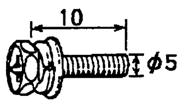
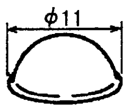
FURUNO ELECTRIC CO ., LTD.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

CODE NO.	008-501-170	03FS-X-9509 -2
TYPE	FP03-07401	1/1

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	KB直付け金具 KB FIXNG PLATE		03-144-1691-1		1	
			CODE NO.	100-263-941		
2	ﾀﾞｽﾄｶﾊﾞｰKB DUST COVER KB		03-144-1693-0		1	
			CODE NO.	100-271-760		
3	ｽﾞﾚ止ﾒｺﾞﾑ NONSLIP RUBBER		03-144-1694-0		1	
			CODE NO.	100-277-860		
4	+ｱﾌﾟｾｯﾄUｾﾑｽB +HEX.BOLT (WASHER HEAD)		M5X10 SUS304		2	
			CODE NO.	000-802-288		
5	ゴム足 RUBBER FEET		SJ-5003 ｸﾛ		4	
			CODE NO.	000-801-787		

DWG NO.
C3483-F01- C

FURUNO ELECTRIC CO ., LTD.

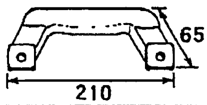
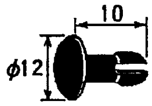
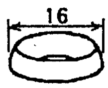
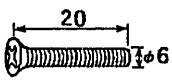
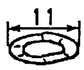
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FURUNO

CODE NO.	008-478-830	03FS-X-9501 -5
TYPE	FP03-06201	1/1

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	取手 HANDLE		14-002-1125-2 CODE NO. 840-211-252	2	
2	ｽﾅｯﾌﾟﾎﾞﾀﾝ PLASTIC RIVET		KB-13ﾖｳ ﾎﾞﾀﾝｸﾛ CODE NO. 000-570-276	4	
3	ﾛｰｾﾞｯﾄ座金 ROSETTE WASHER		M6 C2700W ﾎﾟﾘｼｰﾙ ｸﾛ CODE NO. 000-864-910	4	
4	+丸皿小ﾈｼﾞ OVAL COUNTERSUNK HEAD SCREW		M6X20 C2700W ﾎﾟﾘｼｰﾙ ｸﾛ CODE NO. 000-861-475	4	
5	波座金 WAVE WASHER		WW-6 SUS CODE NO. 000-864-350	4	

DWG NO. C3464-F01- F

FURUNO ELECTRIC CO ., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

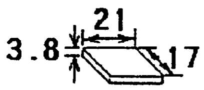
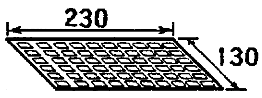
FURUNO

CODE NO.	008-485-480	03FS-X-9504 -5
TYPE	FP03-06502	1/1

付属品表
ACCESSORIES

FR-2115/2115-B
FR-2125/2125-B
FR-2155/2155-B
FR-2135S/2135S-B
FR-2135SW/2125V
FR-2165DS

船舶用レーダ
MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾕｰｻﾞｰｷｰｷｬｯﾌﾟ USER KEYCAP		03-144-1613-1 CODE NO. 100-263-831	4	
2	ﾕｰｻﾞｰｷｰｼｰﾄ(E) USER KEYSHEET(E)		03-144-1655-1 CODE NO. 100-263-881	1	

DWG NO. C3464-F04- E

FURUNO ELECTRIC CO., LTD

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

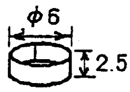
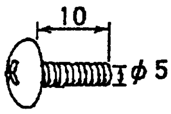
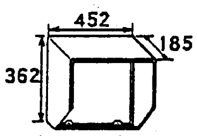
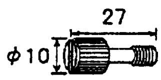
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TYPE	FP03-06503	1/1

付属品表

ACCESSORIES

FR-2115/2115-B
FR-2125/2125W
FR-2125-B
FR-2155/2155-B
FR-2135S/2135SW
FR-2135S-B/2165DS
GD-680/GP-680

船舶用ﾚｰﾀﾞ
ｶﾗｰﾋﾞﾃﾞｵﾌﾟﾛｯﾀ
ｶﾗｰGPSﾌﾟﾛｯﾀ
MARINE RADAR
COLOR VIDEO PLOTTER
COLOR GPS PLOTTER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾏｷｽﾍﾟｰｻｰ SPACER		5X2.5 CODE NO. 000-808-429	2	
2	+ﾄﾗｽﾈｼﾞ SCREW		M5X10 C2700W CODE NO. 000-808-430	2	
3	ﾌｰﾄﾞ HOOD		03-144-1335-1 CODE NO. 100-263-331	1	
4	ﾌｰﾄﾞﾋﾞｽ HOOD RETAINER		03-144-1336-1 CODE NO. 100-266-311	2	

DWG NO. C3464-F02- E

FURUNO ELECTRIC CO., LTD

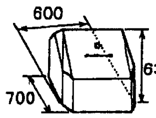
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.		03FS-X-9506 -4
TYPE		1/1

付属品表
ACCESSORIES

FR-2115/2115-B, FR-2125/2125-B, FR-2125W, FR-2155/2155-B, FR-2135S/2135S-B, FR-2135SW/2165DS, FR-2135SW-MSA, GD-680/GP-680, FSV-24

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾀﾞｽﾄｶﾊﾞｰCRT DUST COVER		03-144-1338 CODE NO. 100-271-750	1	

DWG NO. C3464-F06- E

FURUNO ELECTRIC CO ., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-485-360	03FS-X-9301 -2
TYPE	SP03-12501	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR-2115/2115-B 船舶用ﾚｰﾀﾞ FR-2125/2125-B FR-2125V MARINE RADAR	空中線用 FOR ANTENNA UNIT	

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	SPARE	REMARKS/CODE NO.
1	ｶｰﾎﾞﾝﾌﾞﾗｼ CARBON BRUSH		MG120-5X6X11 D8G	1		1	１袋２個入り 2pcs in bag 000-631-716

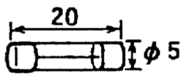
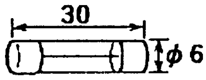
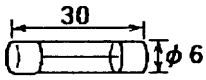
MFR'S NAME	FURUNO ELECTRIC CO.,LTD	DWG NO.	C3464-P01- B	1/1

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-485-370	03FS-X-9302 -2
TYPE	SP03-12502	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR-2115/2115-B FR-2125/2125-B FR-2125V 船舶用レーダ MARINE RADAR	指示部用 FOR DISPLAY UNIT	

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ヒューズ FUSE		FGMB 2A 250V	4		8	000-122-000
2	ヒューズ FUSE		FGBO 20A AC125V	2		4	000-549-015
3	ヒューズ FUSE		FGBO 0.5A AC250V	1		2	000-549-018

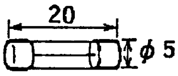
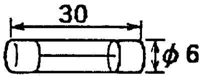
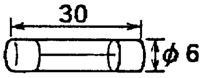
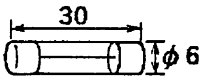
MFR'S NAME	FURUNO ELECTRIC CO., LTD	DWG NO.	C3464-P02- B	1/1

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-485-380	03FS-X-9303 -4
TYPE	SP03-12503	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR		U S E	SETS PER VESSEL
	FR-2115/2115-B FR-2125/2125V FR-2125W/2125-B FR-2155/2155-B FR-2135S/2135SW FR-2135S-B/2165DS	船舶用レーダ MARINE RADAR	指示部 FOR DISPLAY UNIT	

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ヒューズ FUSE		FGMB 2A 250V	4		8	000-122-000
2	ヒューズ FUSE		FGBO 0.5A AC250V	1		2	000-549-018
3	ヒューズ FUSE		FGBO 5A AC250V	2		4	000-549-022
4	ヒューズ FUSE		FGBO 10A AC125V	2		4	000-549-065

MFR'S NAME	FURUNO ELECTRIC CO., LTD	DWG NO.	C3464-P03- C	1/1

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

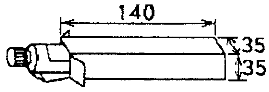
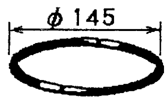
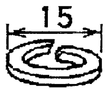
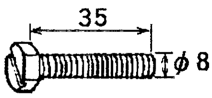
A-15

FURUNO

CODE NO.	008-485-250	03FS-X-9409 -0
TYPE	CP03-24201	1/1

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	スリーボンド SEALANT		1211 50G	CODE NO. 000-854-118	1	
2	Oリング O-RING		JISB2401-P135	CODE NO. 000-808-309	1	
3	ミガキ平座金 FLAT WASHER		M8 SUS304	CODE NO. 000-864-130	8	
4	バネ座金 SPRING WASHER		M8 SUS304	CODE NO. 000-864-262	8	
5	六角ボルト スリ割り HEX.BOLT (SLOTTED HEAD)		M8X35 SUS304	CODE NO. 000-862-153	8	

DWG NO.
C3453-M04- A

FURUNO ELECTRIC CO ., LTD.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

A-16.

FURUNO

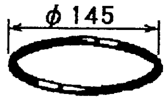
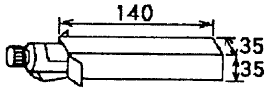
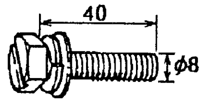
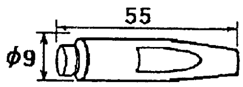
CODE NO.	008-487-130	03FS-X-9403 -2
TYPE	CP03-19101	1/1

工事材料表

INSTALLATION MATERIALS

FR-2115/2125/2125W 船舶用ﾚｰﾀﾞ

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	Oﾘﾝｸﾞ O-RING		JISB2401-P135 CODE NO. 000-808-309	1	
2	ｽﾘｰﾎﾞﾝﾄﾞ ADHESIVE		1211 50G CODE NO. 000-854-118	1	
3	六角ｾﾑｽB ｽﾘﾜﾘ HEX. BOLT (SLOTTED, WASHER HEAD)		M8X40 SUS304 CODE NO. 000-882-071	8	
4	ﾋﾟﾝ PIN		03-141-0301-2 CODE NO. 100-266-882	2	

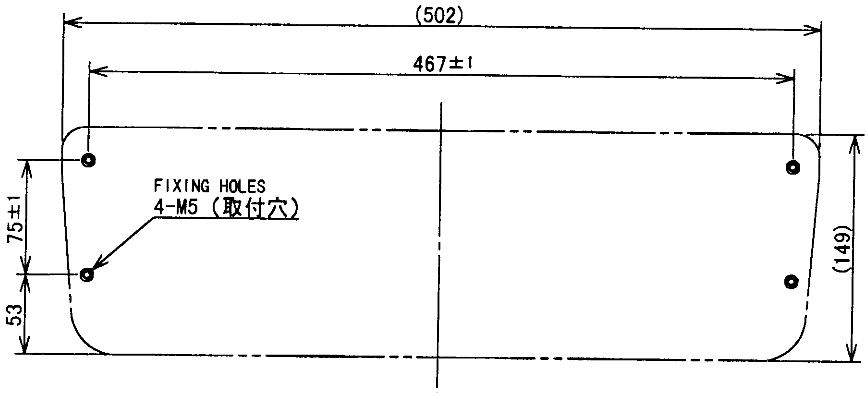
DWG NO.
C3464-M04- C

FURUNO ELECTRIC CO., LTD

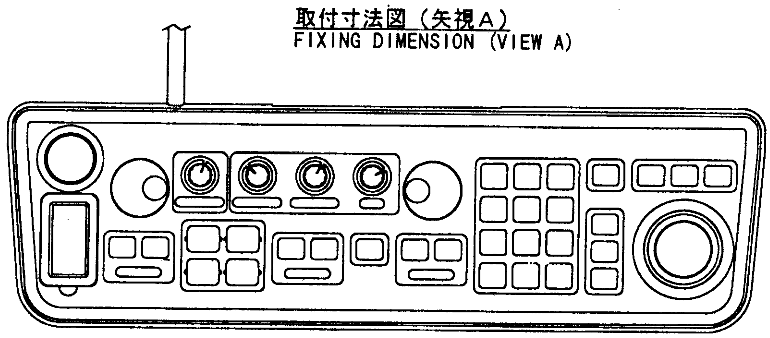
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

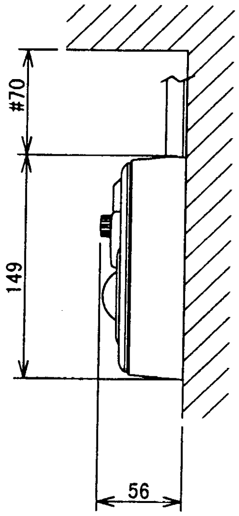
寸法区分(mm) DIMENSION	公差(mm) TOL.
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3
500<L≦1000	±4

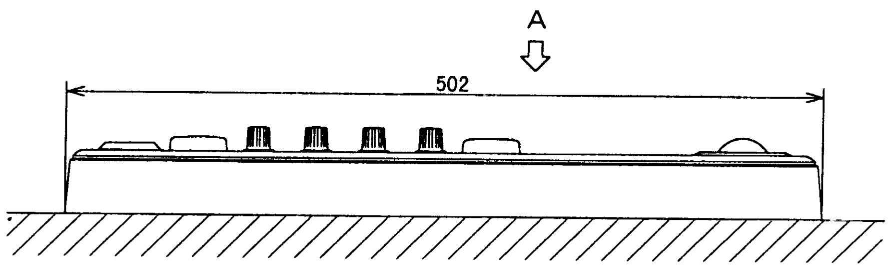
表1 TABLE 1

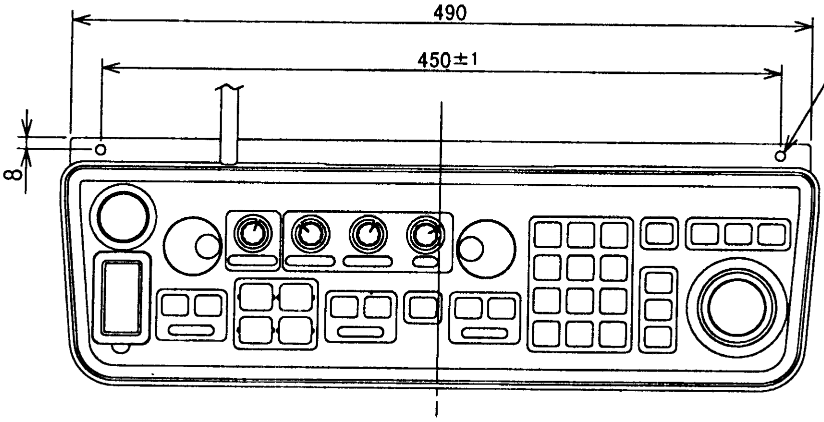


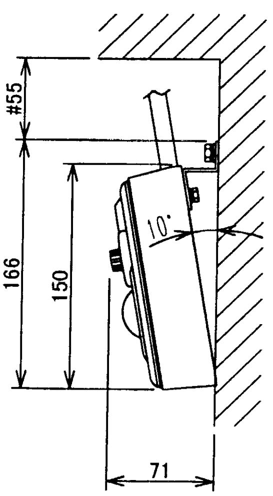
取付寸法図（矢視A）
FIXING DIMENSION (VIEW A)











＊KB直付金具使用時
MOUNTING WITH KB FIXTURE

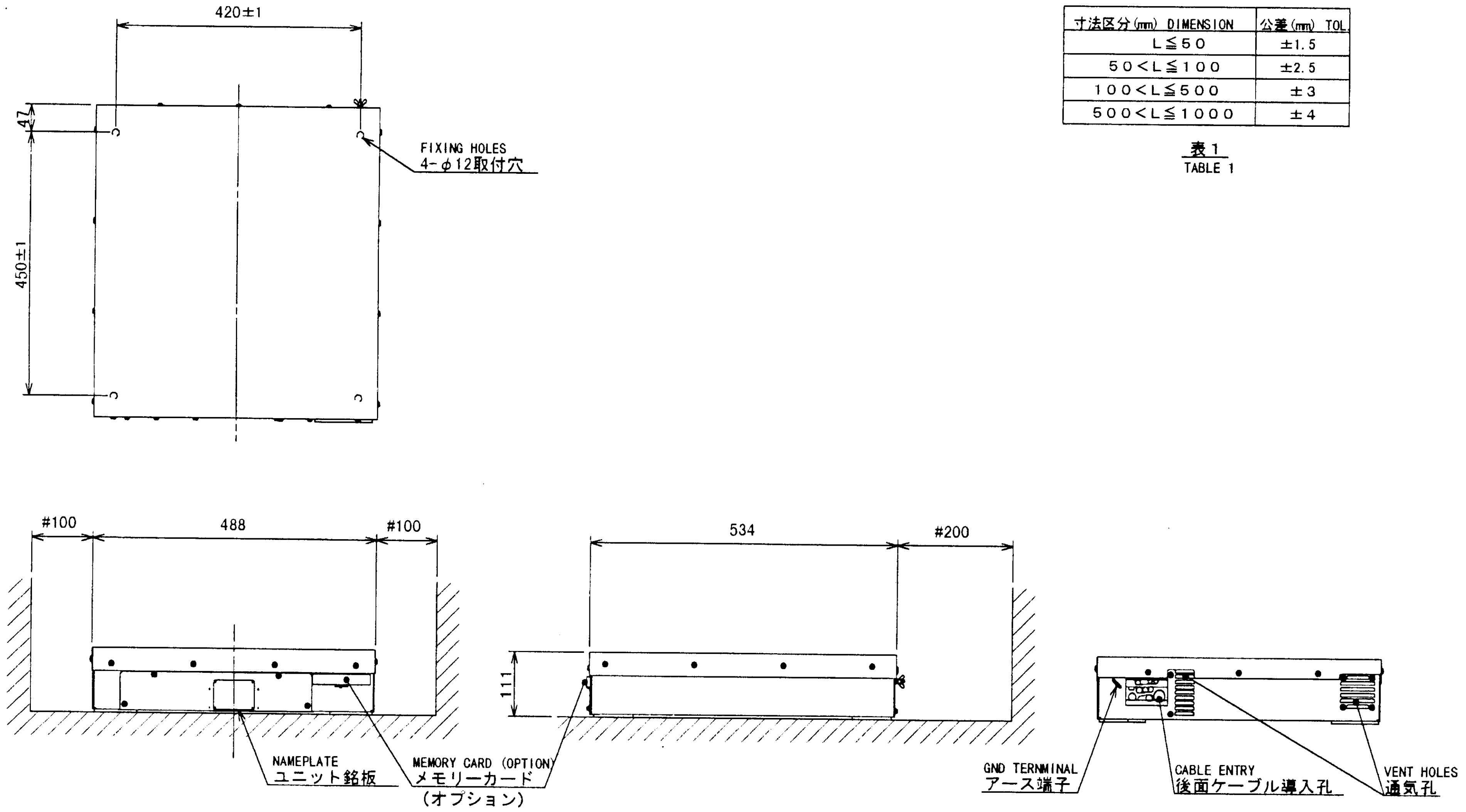
注　記　1）　#印寸法は最小サービス空間寸法とする。
　　　　2）　指定外の寸法公差は、表1による。

NOTE　1. #: RECOMMENDED SERVICE CLEARANCE.
　　　2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN July 14 '99 T.YAMASAKI		TITLE RCU-011
CHECKED July 15 '99 K.Kusunoki		名称 操作部
APPROVED July 15 '99 K.Kusunoki	OTHERS FR-2115/2125-B	外寸図
SCALE 1/5 MASS 5.2 kg	MASS W/ CABLE AND FIXTURE. 質量はケーブル・取付金具を含む	NAME CONTROL UNIT
DWG. No. C3471-G03- B	03-144-1690-G2	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO



寸法区分(mm) DIMENSION	公差(mm) TOL.
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3
500<L≦1000	±4

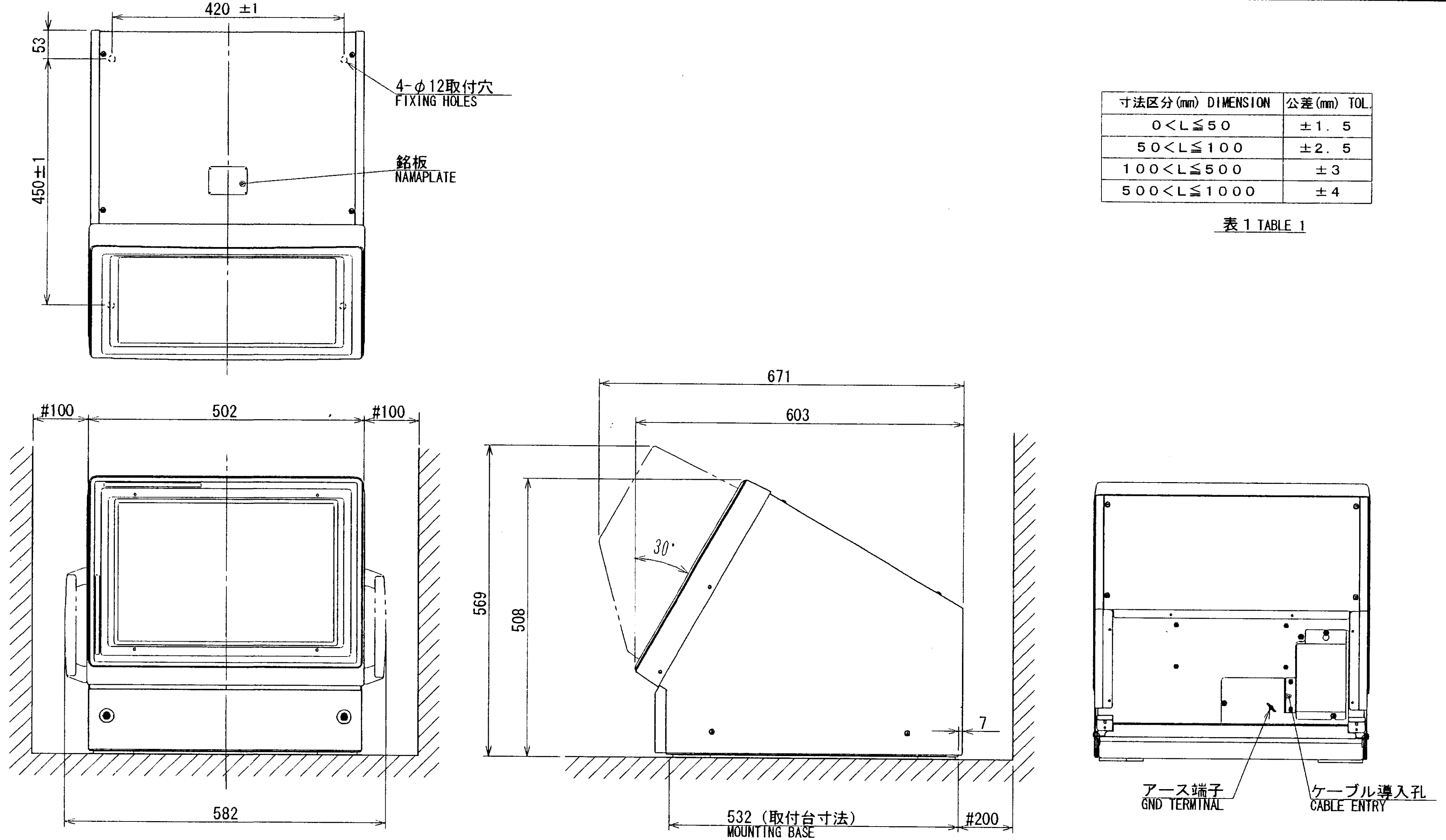
表1
TABLE 1

注記 1) #印寸法は最小サービス空間寸法とする。
2) 指定外の寸法公差は表1による。

NOTE 1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN Apr. 1'99 T.YAMASAKI		TITLE RPU-011
CHECKED Apr. 2'99 K.Kusunoki		名称 制御部
APPROVED Apr. 2'99 K.Kusunoki	RDP-124 RDP-126	外寸図
SCALE 1/10 / MASS 17 kg		NAME PROCESSOR UNIT
DWG. No. C3471-G02- A	03-144-1410-G2	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



寸法区分(mm) DIMENSION	公差(mm) TOL.
0＜L≦50	±1.5
50＜L≦100	±2.5
100＜L≦500	±3
500＜L≦1000	±4

表1 TABLE 1

注　記　1）＃印寸法は最小サービス空間寸法とする。

2）指定外の寸法公差は、表1による。

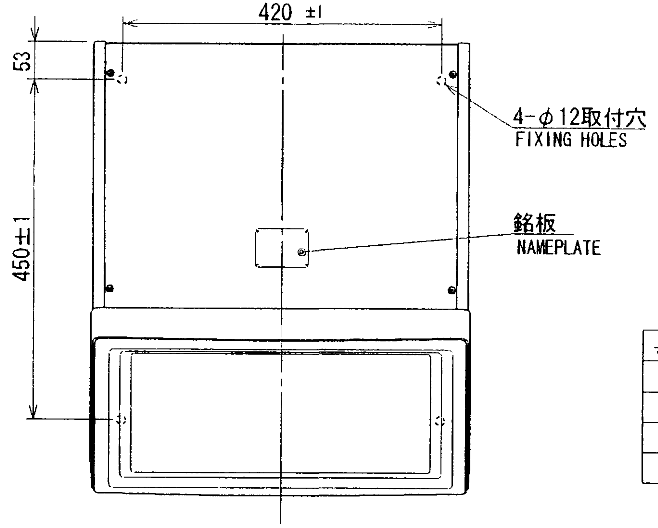
NOTE　1. #: RECOMMENDED SERVICE CLEARANCE.

2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN Jul/19'00 T.YAMASAKI		TITLE RDP-124-M
CHECKED Jul/19'00 Y.K	OTHERS FR-2125 FR-2115	名称 モニター部(制御部/パネル分離型) 外寸図
APPROVED Jul/19'00 Y.K		
SCALE 1/10	MASS 47 kg ±10%	NAME MONITOR UNIT (LESS PROCESSOR/CONTROL PANEL)
DWG. No. C3464-G06- C	03-144-1030-G3	OUTLINE DRAWING

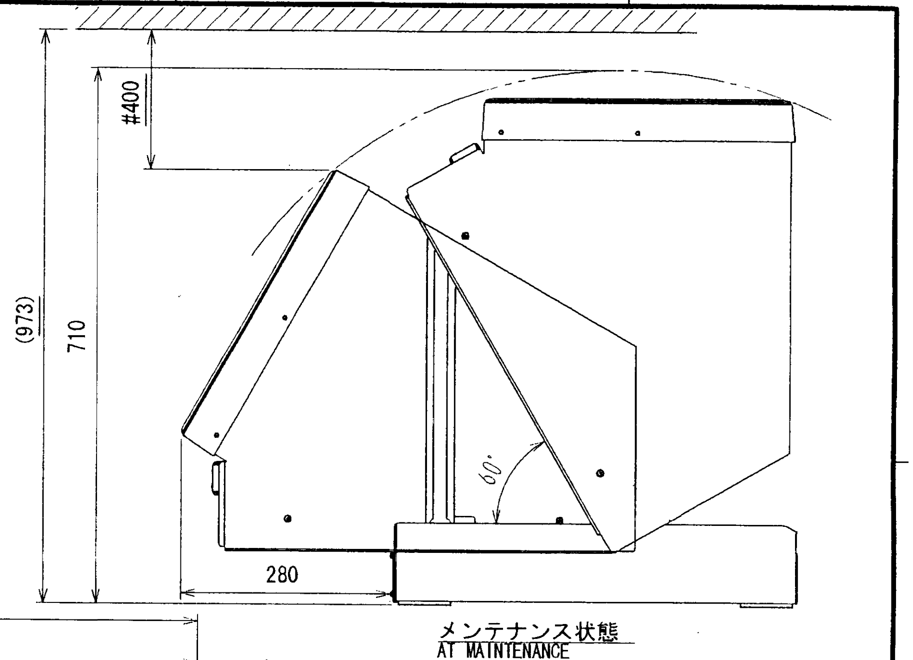
FURUNO ELECTRIC CO., LTD.

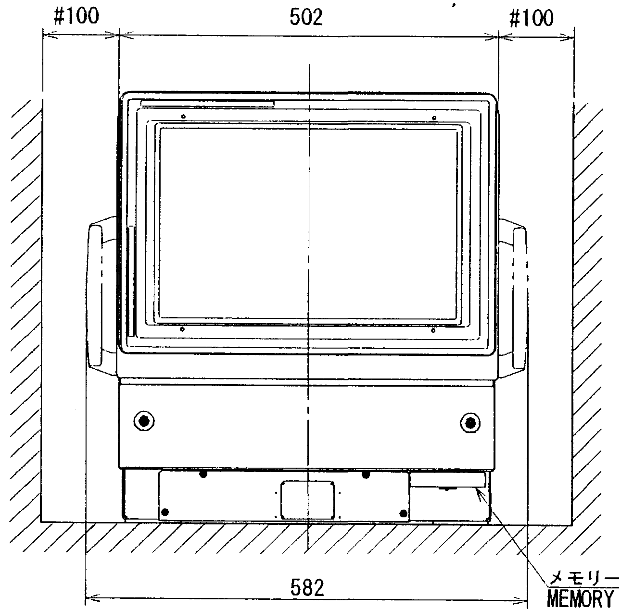
FURUNO

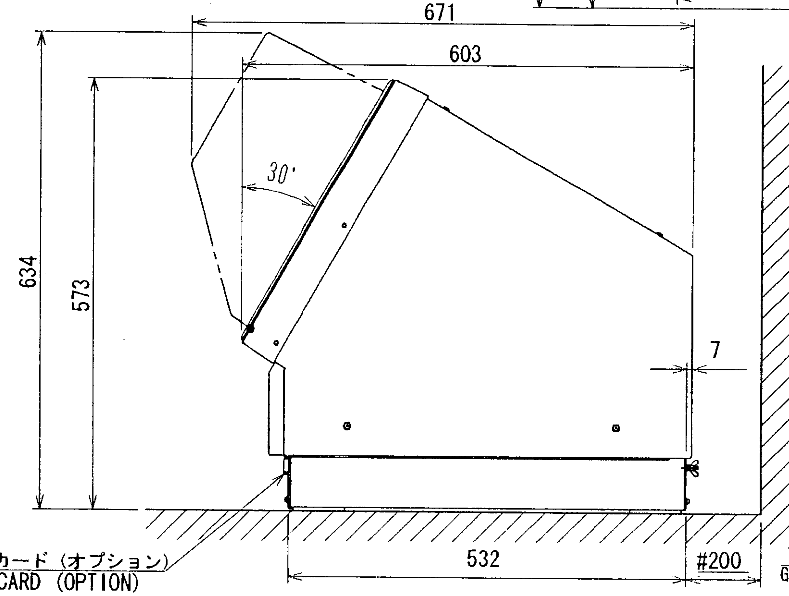


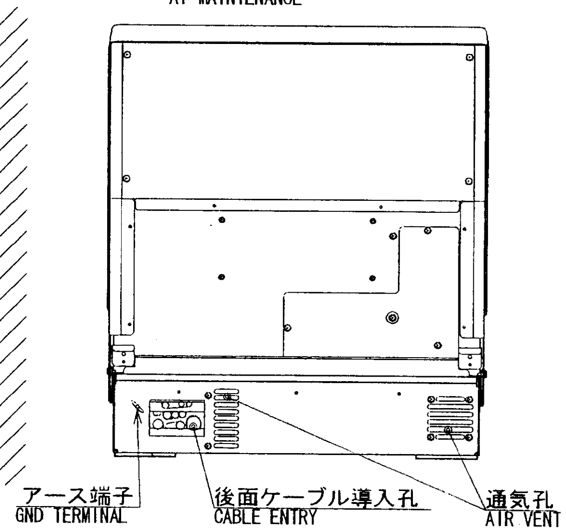
寸法区分(mm) DIMENSION	公差(mm) TOL.
0＜L≦50	±1．5
50＜L≦100	±2．5
100＜L≦500	±3
500＜L≦1000	±4

表1 TABLE 1







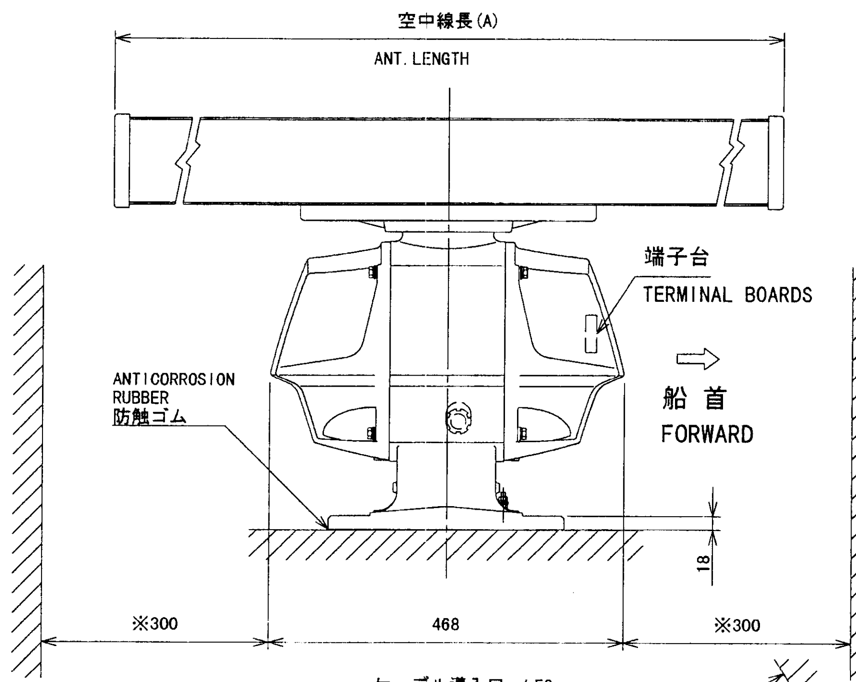


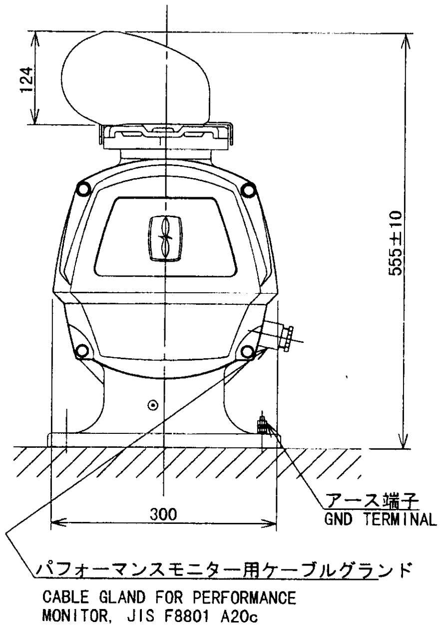
注　記　1）#印寸法は最小サービス空間寸法とする。
2）指定外の寸法公差は、表1による。

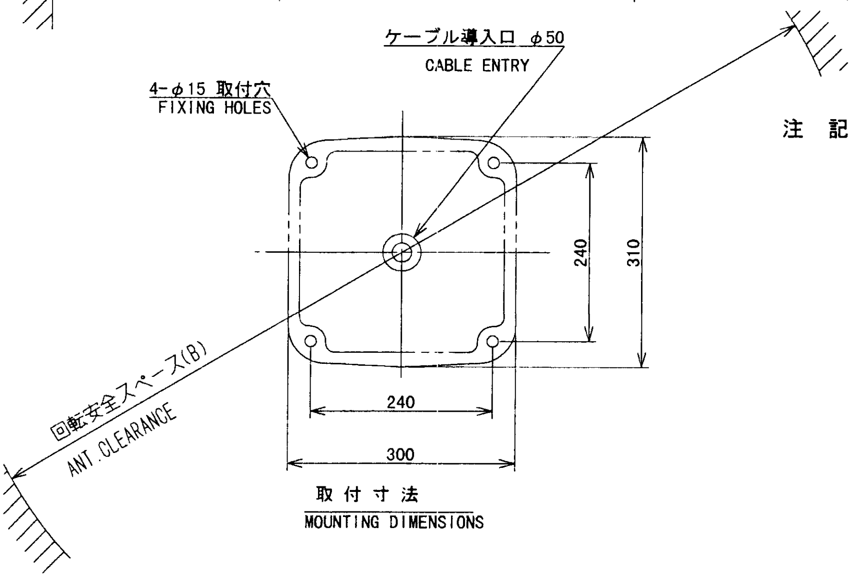
NOTE
1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN July 19 '00 T. YAMASAKI		TITLE	RDP-124-M
CHECKED July 19 '00 Y. Kim	OTHERS FR-2125 FR-2115	名称	モニター部（操作部分離型）
APPROVED July 19 '00 Y. Kim			外寸図
SCALE 1/10	MASS 61 ±10% kg	NAME	MONITOR UNIT (LESS CONTROL PANEL)
DWG. No. C3464-G07- C	03-144-1020-G3		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.







取 付 寸 法
MOUNTING DIMENSIONS

注 記

NOTE 1. ※：推奨サービス空間
RECOMMENDED SERVICE CLEARANCE

NOTE 2.

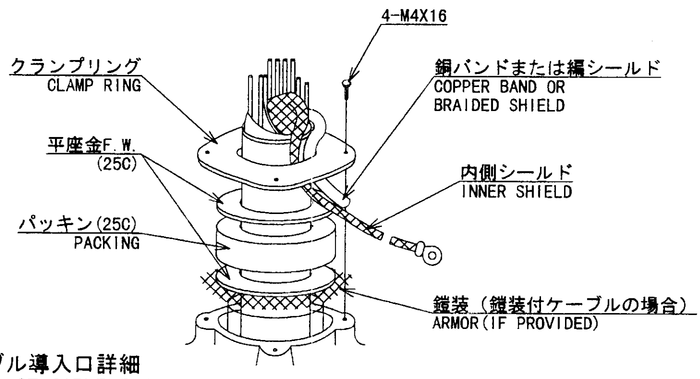
種類 ** ANT. TYPE	120cm型TYPE (XN-12AF)
空中線長(A) ANT. LENGTH	1,260±10 mm
回転安全スペース(B) ANT. CLEARANCE	1,400 mm
質 量 MASS	33 kg

**選択可能な空中線部種類は、レーダー型式により異なる。各仕様を参照のこと。
SELECTABLE ANTENNA TYPE DEPENDS ON RADAR MODEL. SEE INDIVIDUAL SPECIFICATIONS.

NOTE 3. 指定外の寸法公差は表１による。
REFER DIMENSION TOLERANCE TO TABLE 1.

範 囲 DIMENSION	公差 TOL
０＜Ｌ≦５０	±1.5mm
５０＜Ｌ≦１００	±2.5mm
１００＜Ｌ≦５００	±３mm
５００＜Ｌ≦１０００	±４mm
１０００＜Ｌ≦２０００	±５mm
２０００＜Ｌ≦４０００	±７mm
４０００＜Ｌ≦８０００	±１０mm
８０００＜Ｌ	±１５mm

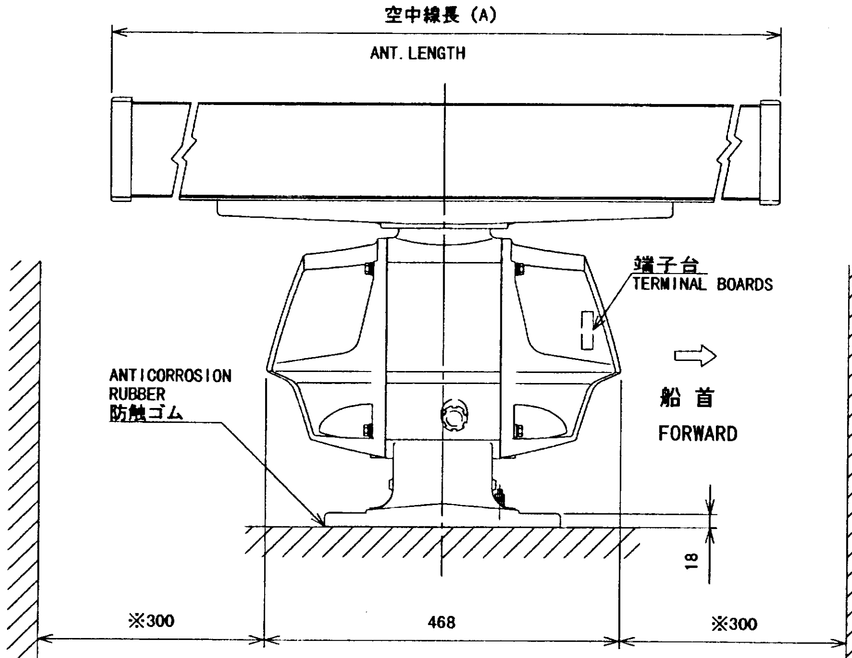
表 1
TABLE 1

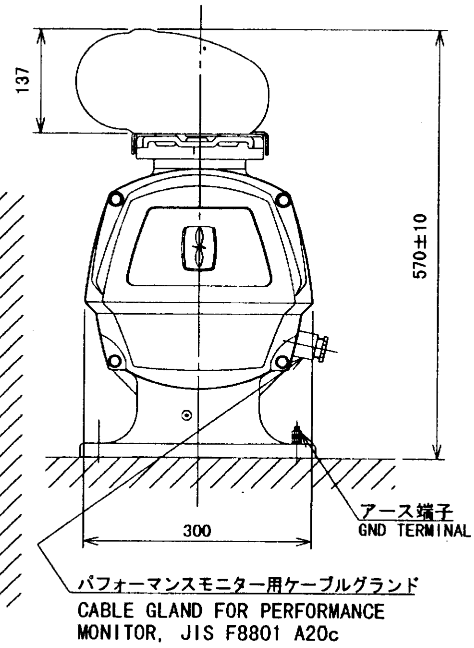


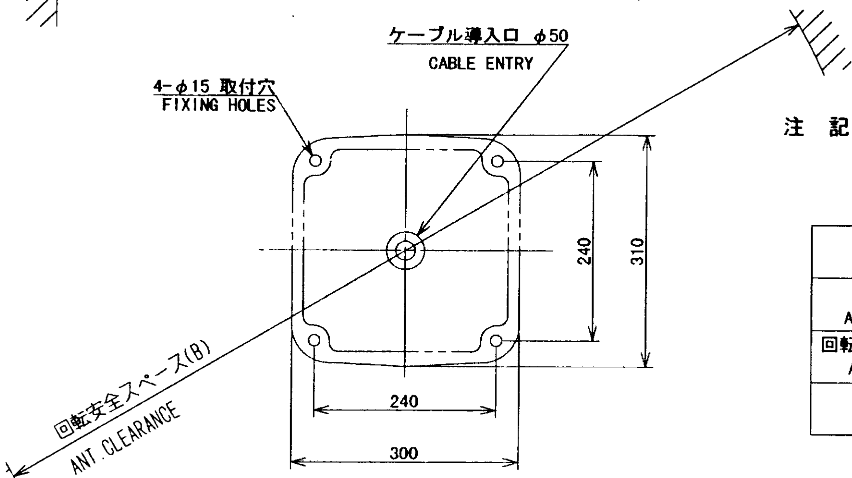
ケーブル導入口詳細
DETAIL OF CABLE ENTRY

DRAWN Aug 31 '99 T.YAMASAKI		TITLE	RSB-0074/0075-12AF
CHECKED Aug 31 '99 K.Kusunoki	OTHERS FR-1500 SER.	名称	空中線部
APPROVED Aug 31 '99 K.Kusunoki	FR-1700 SER. FR-2115/2125		外寸図
SCALE 1/10 MASS kg		NAME	ANTENNA UNIT
DWG. No. C3464-G04- E	03-144-3000-G2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.







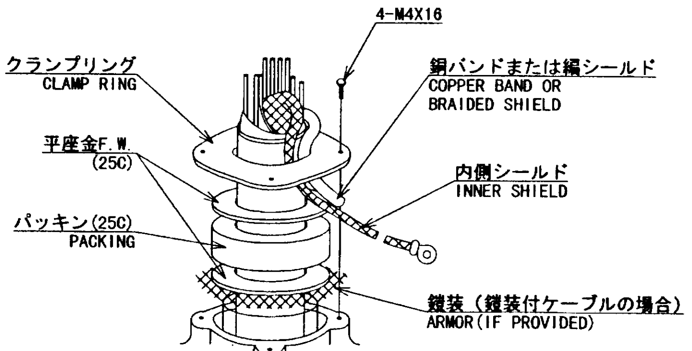
取付寸法
MOUNTING DIMENSIONS

注 記　NOTE 1. ※：推奨サービス空間
RECOMMENDED SERVICE CLEARANCE

NOTE 2.

種類 ** ANT. TYPE	200cm型TYPE (XN-20AF)	240cm型TYPE (XN-24AF)
空中線長 (A) ANT. LENGTH	2,040±10 mm	2,550±10 mm
回転安全スペース (B) ANT. CLEARANCE	2,200 mm	2,700 mm
質 量 MASS	39 kg	42 kg

**選択可能な空中線部種類は、レーダー型式により異なる。各仕様を参照のこと。
SELECTABLE ANTENNA TYPE DEPENDS ON RADAR MODEL. SEE INDIVIDUAL SPECIFICATIONS.



ケーブル導入口詳細
DETAIL OF CABLE ENTRY

NOTE 3. 指定外の寸法公差は表1による。
REFER DIMENSION TOLERANCE TO TABLE 1.

範 囲　DIMENSION	公差　TOL
0＜L≦50	±1.5mm
50＜L≦100	±2.5mm
100＜L≦500	±3mm
500＜L≦1000	±4mm
1000＜L≦2000	±5mm
2000＜L≦4000	±7mm
4000＜L≦8000	±10mm
8000＜L	±15mm

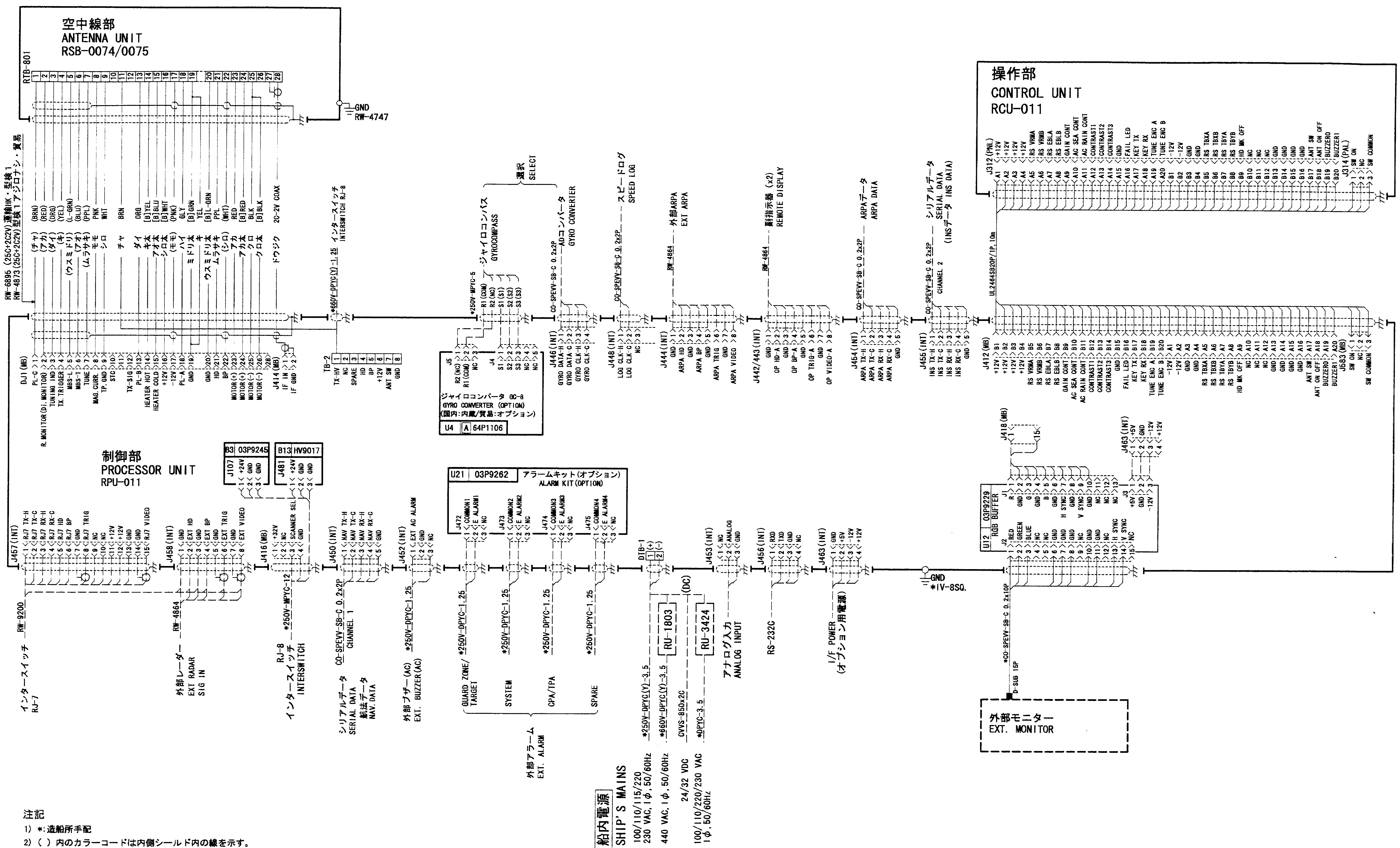
表 1
TABLE 1

DRAWN Aug. 20 '99 T. YAMASAKI		TITLE RSB-0074/0075-20/24AF
CHECKED Aug. 20 '99 K. Kusunoki	OTHERS FR-1500 SER.	名称 空中線部
APPROVED Aug. 20 '99 K. Kusunoki	FR-1700 SER. FR-2115/2125	外寸図
SCALE 1/10 MASS kg		NAME ANTENNA UNIT
DWG. No. C3464-G02- D	03-143-3000-G2	OUTLINE DRAWING

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S-1



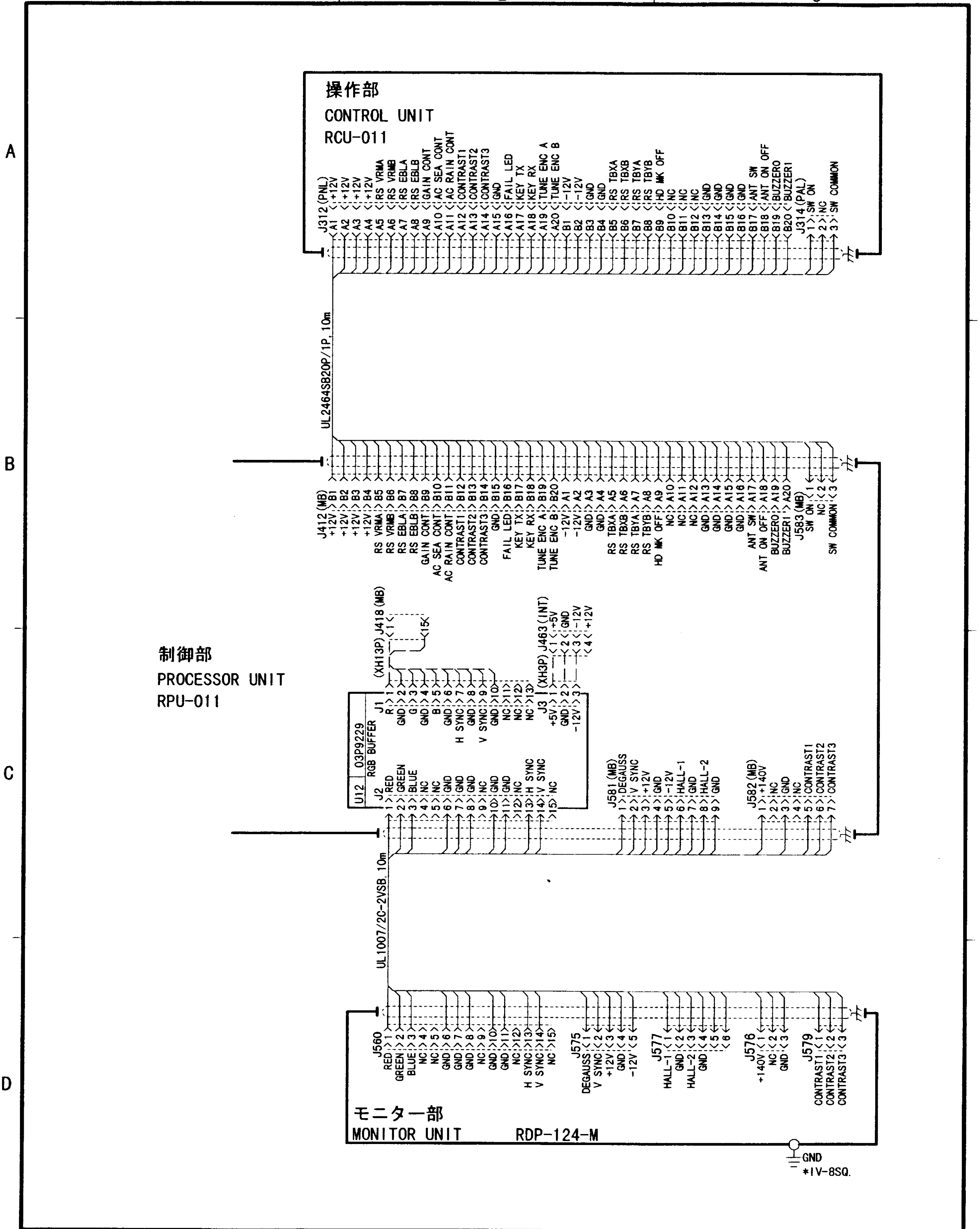
注記
1) *:造船所手配
2) ( ) 内のカラーコードは内側シールド内の線を示す。

NOTE
1. *:SHIPYARD SUPPLY
2. WIRE COLOR CODE ( ): INSIDE WIRES. B-: BIG WIRES, L-: LIGHT COLOR.

DRAWN Nov. 6 '01 T. YAMASAKI		TYPE	FR-2115/2125-B
CHECKED Nov 6 '01 Y. Ich		名称	船舶用レーダー(ブラックボックス型)
APPROVED Nov 6 '01 Y. K.			相互結線図
SCALE	MASS kg	NAME	MARINE RADAR (BLACK-BOX TYPE)
DWG. No. C3483-C03- C	03-144-6034-2		INTERCONNECTION DIAGRAM

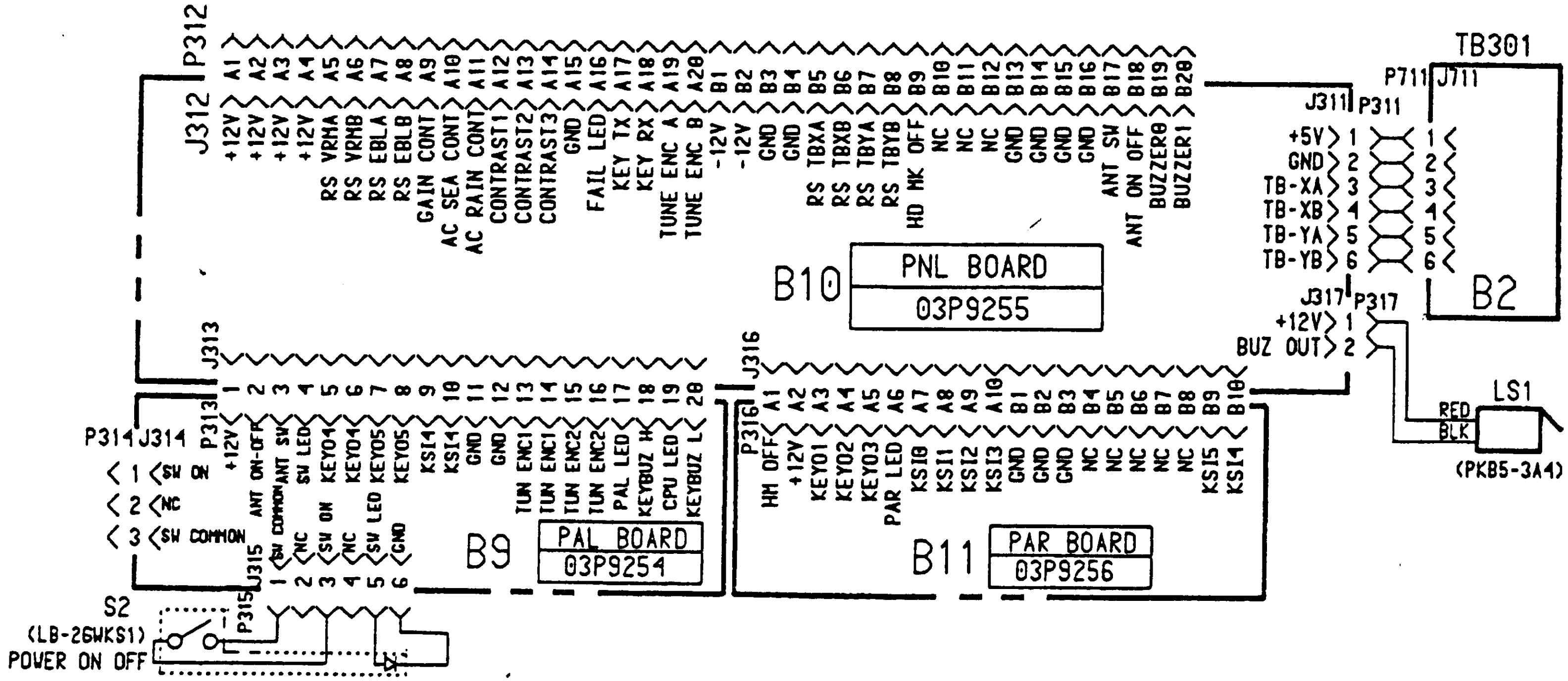
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DRAWN Aug 26 '99 T.YAMASAKI		TITLE	FR-2115/2125-B
CHECKED Aug 26 '99 K.Kusunoki		名称	船舶用レーダー操作部、モニター部（分離型）
APPROVED Aug 26 '99 K.Kusunoki			相互結線図
SCALE	MASS kg	NAME	MARINE RADAR CONTROL/DISPLAY UNIT
DWG. No. C3483-C02- B			INTERCONNECTION DIAGRAM

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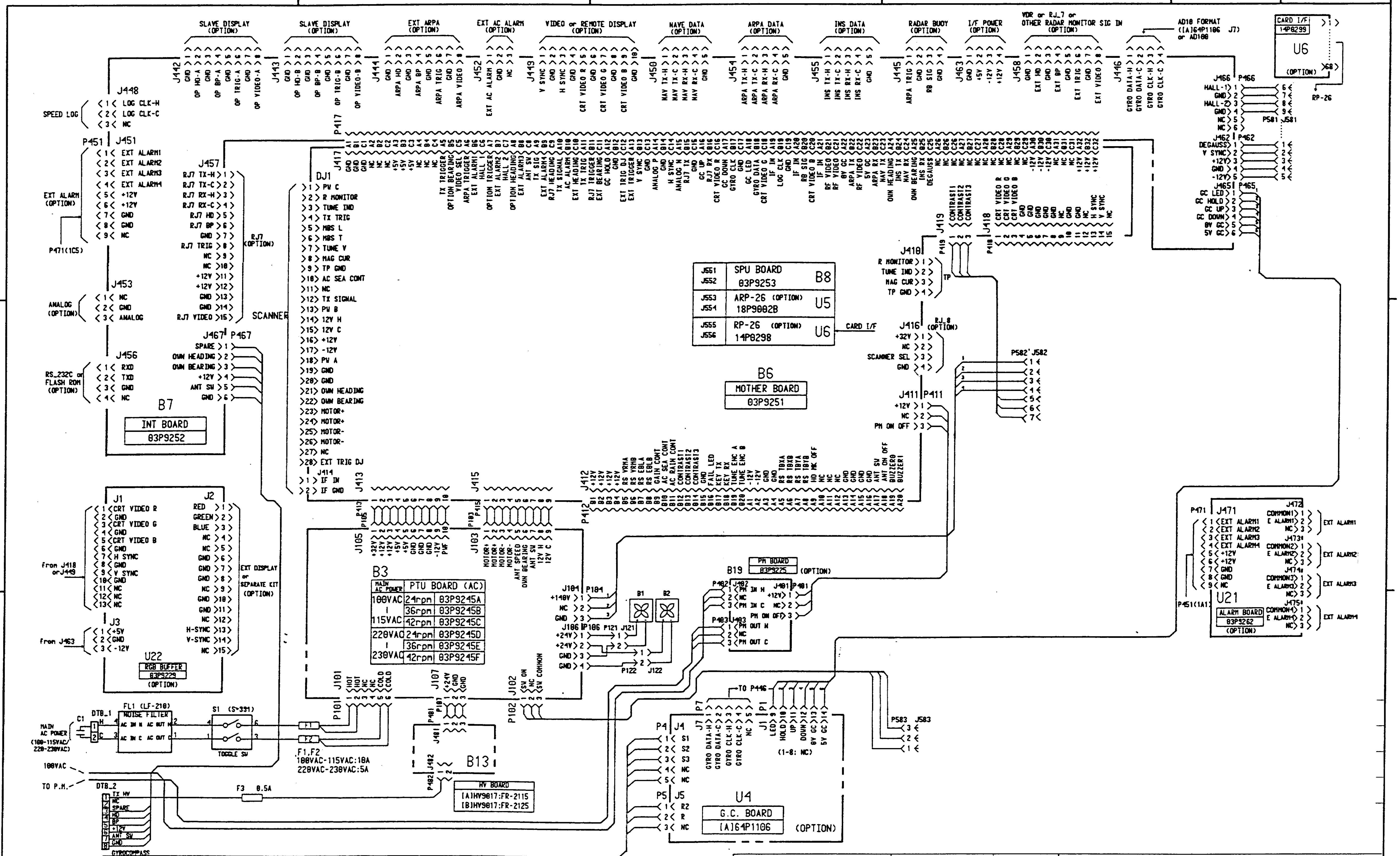


DRAWN Aug 26 '99 T.YAMASAKI	FR-2135SB		TYPE RCU-011
CHECKED Aug 26 '99 K.Kusunoki	FR-2155-B		名称 操作部（総合）
APPROVED Aug 26 '99 K.Kusunoki	FR-2125-B		回路図
	FR-2115-B		
SCALE / MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME CONTROL UNIT(GENERAL)
DWG NO. C3483-K02- A	03-144-6008- 10		SCHEMATIC DIAGRAM

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S - 4

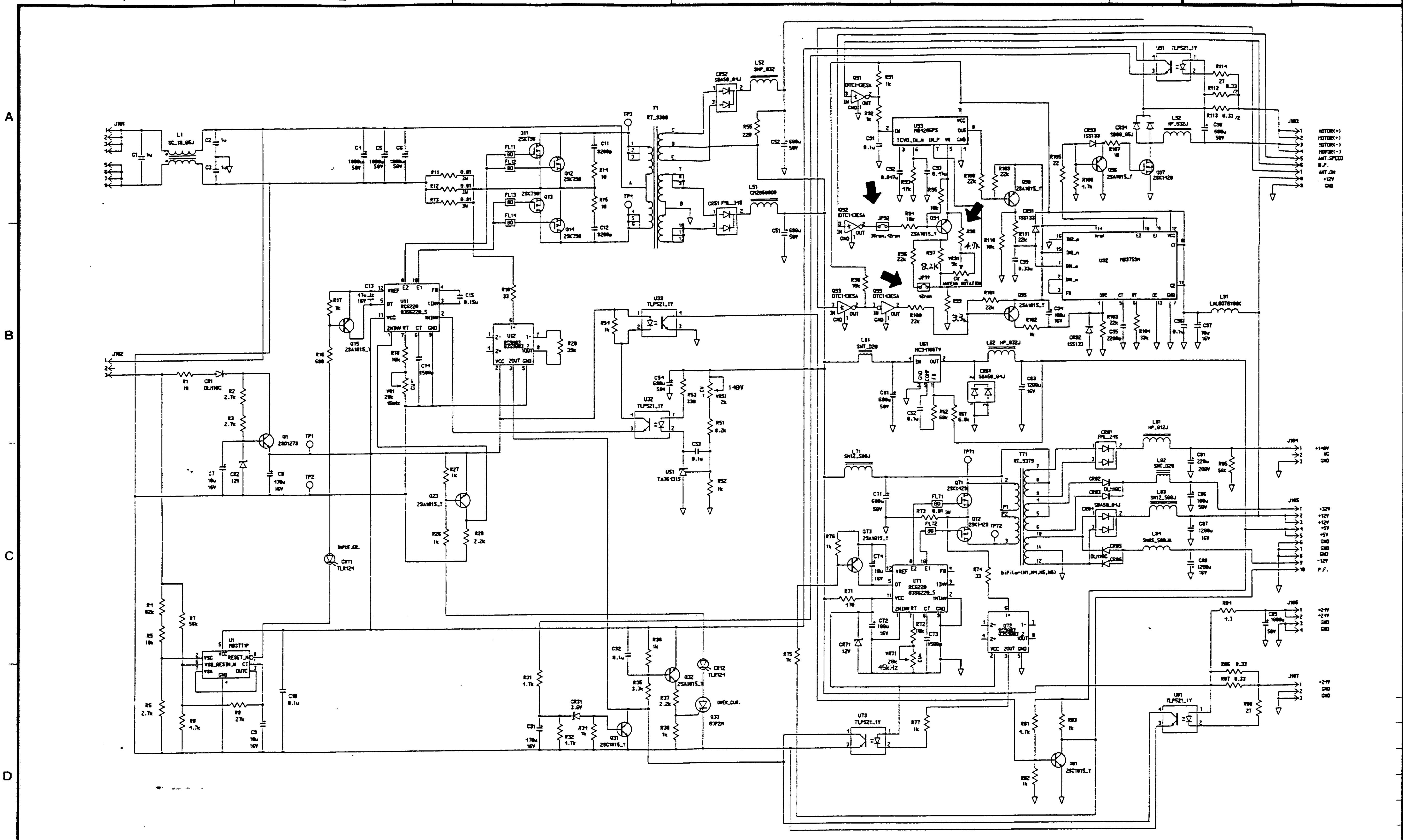


DRAWN Aug 26 '99 T.YAMASAKI	FR-2135SB		TYPE	RPU-011
CHECKED Aug 26 '99 K.Kusunoki	FR-2155-B		名称	制御部（総合）
APPROVED Aug 26 '99 K.Kusunoki	FR-2125-B			回路図
	FR-2115-B			
SCALE / MASS kg	APPLICABLE TO: (MODEL)	BLOCK NO.	NAME	PROCESSOR UNIT(GENERAL)
DWG NO. C3483-K01- A	03-144-6008- 10			SCHEMATIC DIAGRAM

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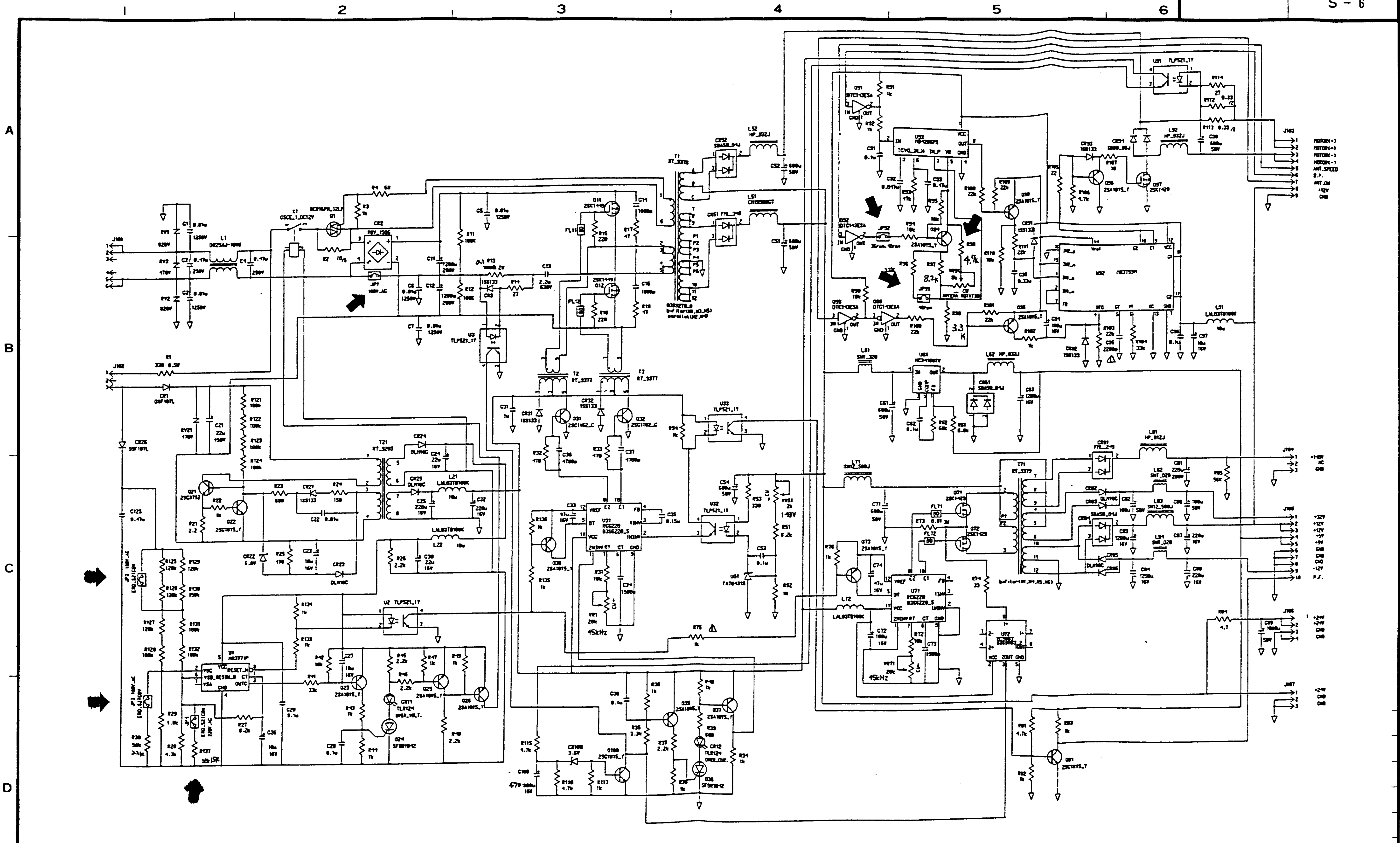
S - 5



PWB	ANTENNA	JP91	JP92	R98
03P9246 A	24rpm	Cut	Cut	4.7 k
03P9246 C	42rpm	Cut	Short	1.2 k

DRAWN Sep. 4. '98 E. Kishimi		TYPE 03P9246
CHECKED Sep 4 '98 K. Okamoto		名称 DC電源基板
APPROVED Sep 4 '98 M. Yamamoto	FR-2125 FR-2115	回路図
SCALE / MASS kg	APPLICABLE TO: (MODEL) BLOCK NO.	NAME PTU BOARD(DC)
DWG NO. C3464-K18- B	03-144-6020- 5	SCHEMATIC DIAGRAM

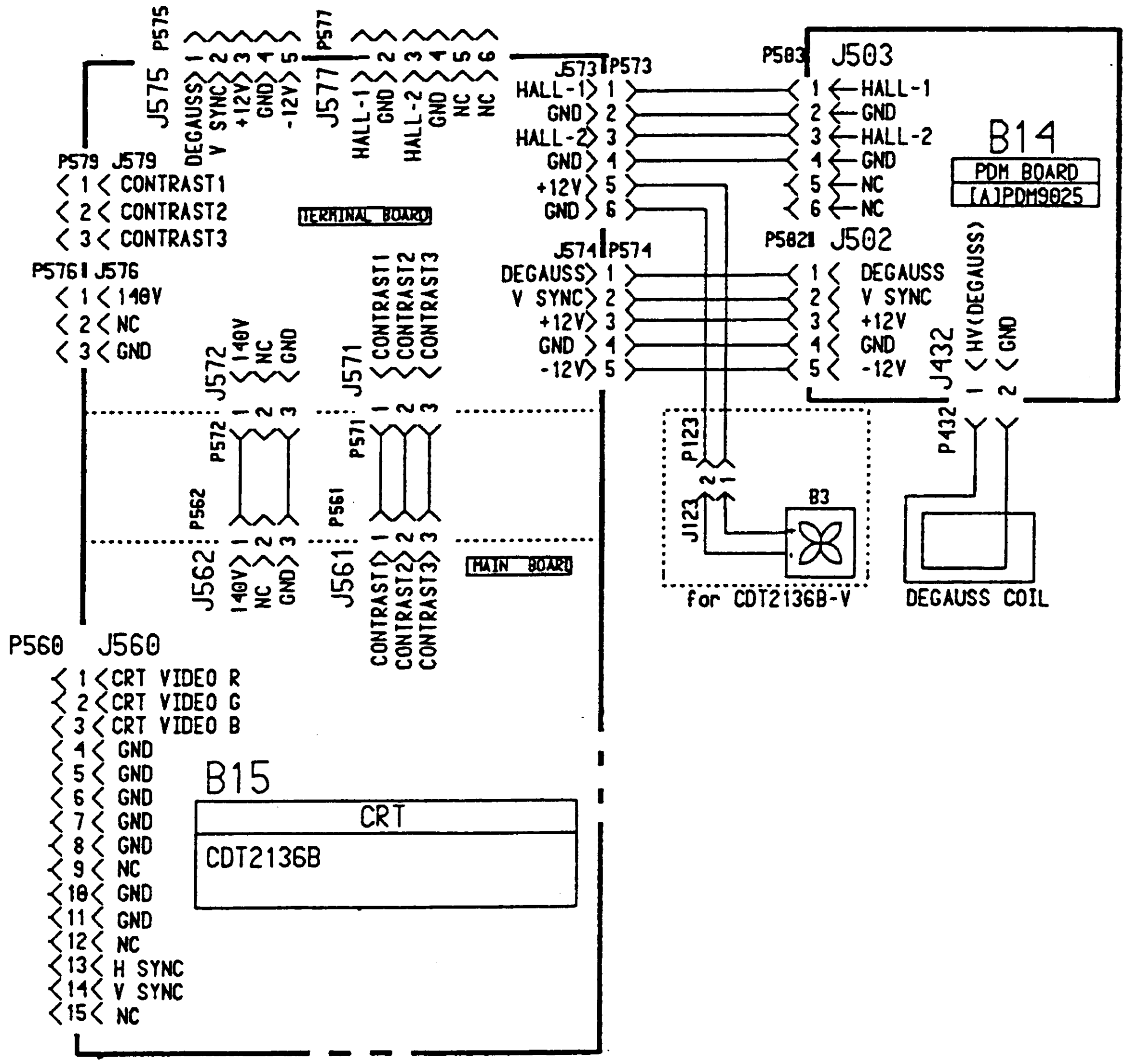
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PWB	POWER	ANTENNA	JP1	JP2	JP3	JP4	JP91	JP92	R98
03P9245 A	100 VAC	24rpm	Short	Short	Short	Cut	Cut	Cut	4.7 k
03P9245 C	100 VAC	42rpm	Short	Short	Short	Cut	Cut	Short	1.2 k
03P9245 D	220 VAC	24rpm	Cut	Cut	Cut	Short	Cut	Cut	4.7 k
03P9245 F	220 VAC	42rpm	Cut	Cut	Cut	Short	Cut	Short	1.2 k

DRAWN Sep.4.'9? E. ...			TYPE 03P9245
CHECKED Sep.4.'98 K. Okamoto			名称 AC電源基板
APPROVED Sep.4.'98 M. Yamamoto	FR-2125 FR-2115		回路図
SCALE / ; MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME PTU BOARD(AC)
DWG NO. C3464-K03- C	03-144-6019- 6		SCHEMATIC DIAGRAM

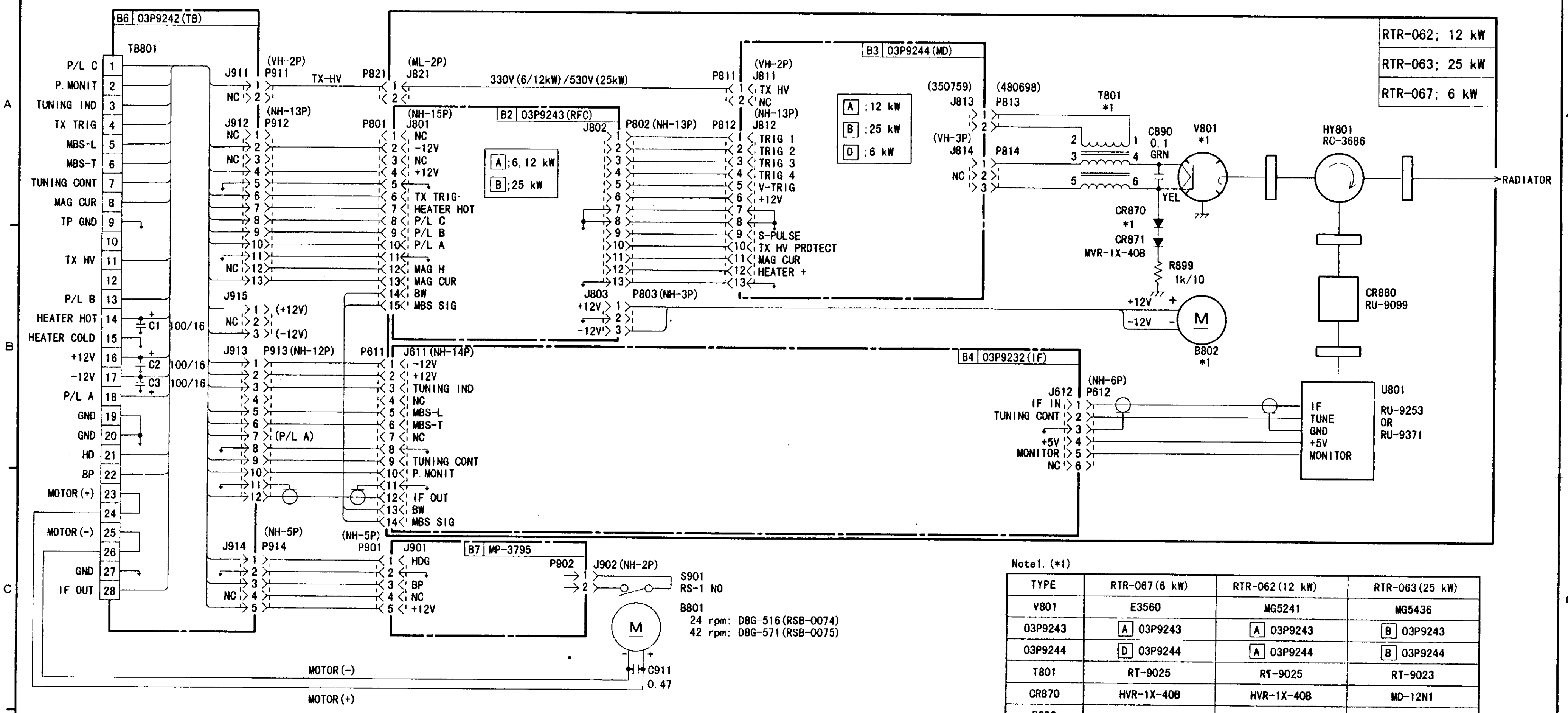
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DRAWN Aug 26 '99 T.YAMASAKI	FR-2135SB		TYPE RDP-124-M
CHECKED Aug 26 '99 K.Kusunoki	FR-2155-B		名称 モニター部 (総合)
APPROVED Aug 26 '99 K.Kusunoki	FR-2125-B FR-2115-B		回路図
SCALE / MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME MONITOR UNIT(GENERAL)
DWG NO. C3483-K03- A	03-144-6008- 10		SCHEMATIC DIAGRAM

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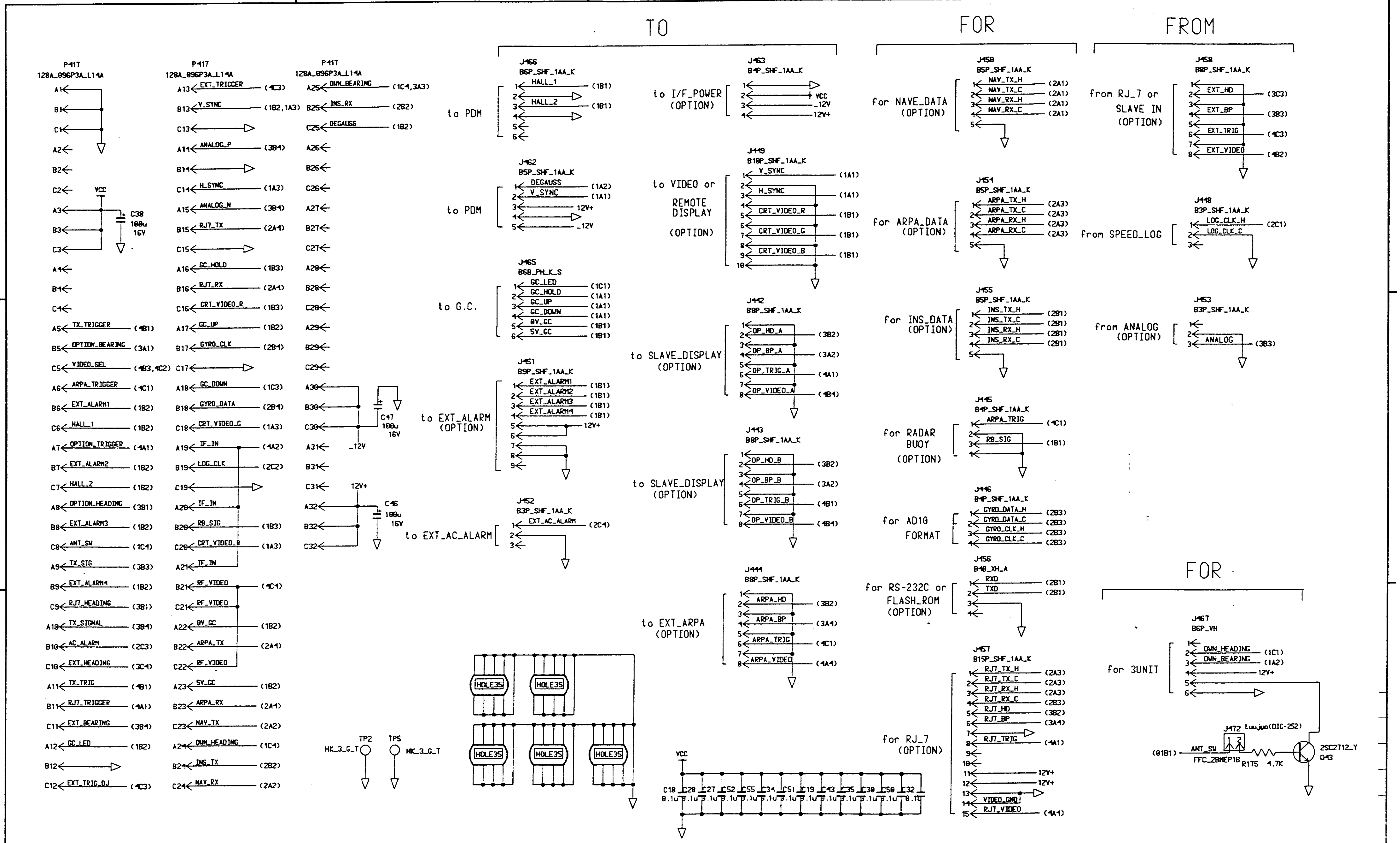


Note1. (*1)

TYPE	RTR-067 (6 kW)	RTR-062 (12 kW)	RTR-063 (25 kW)
V801	E3560	MG5241	MG5436
03P9243	A 03P9243	A 03P9243	B 03P9243
03P9244	D 03P9244	A 03P9244	B 03P9244
T801	RT-9025	RT-9025	RT-9023
CR870	HVR-1X-40B	HVR-1X-40B	MD-12N1
B802	——	——	109P0824H602

DRAWN Sep 4 '98 T. Yamasaki		TYPE RSB-0074/0075
CHECKED Sep 4 '98 K. Kusunoki	FR-1505/1510/1525M3	NAME ANTENNA UNIT
APPROVED Sep 4 '98 K. Kusunoki	FR-1710/1725 FR-2115/2125	SCHEMATIC DIAGRAM
DWG. No. E3464-K02- F	03-144-6021- 1	

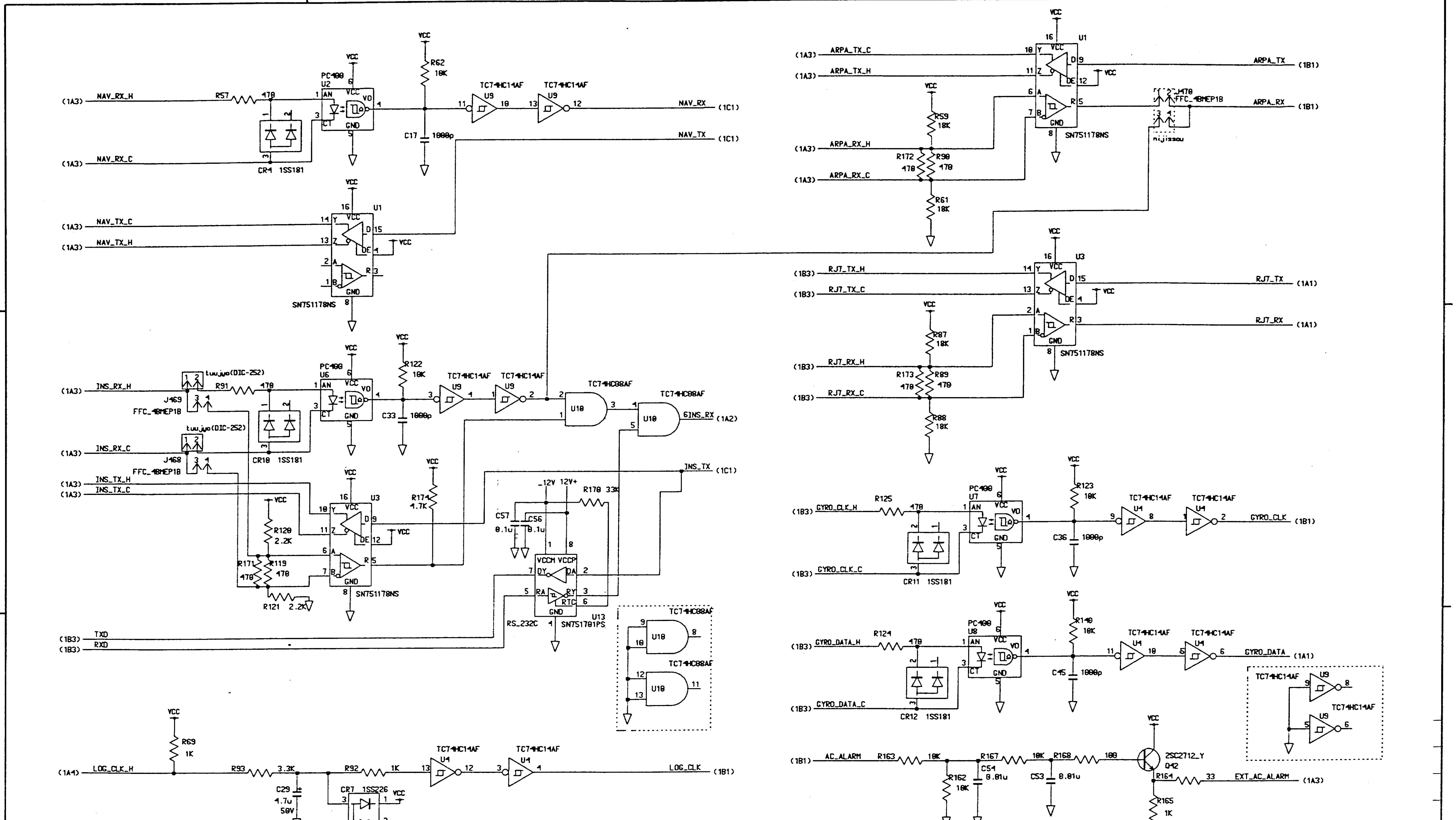
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DRAWN Apr. 4 '99 T. YAMASAKI			TYPE 03P9252
CHECKED Apr. 2 '99 K. Kusunoki	OTHERS		名称 INT基板（1／4）
APPROVED Apr. 2 '99 K. Kusunoki	FR-2125 FR-2115		回路図
SCALE ／ MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME INT BOARD(1/4)
DWG NO. C3464-K08- B	03-144-6011- 5		SCHEMATIC DIAGRAM

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NOTE:

J468	J469	
J1-J2	J1-J2	CURRENT ROOP
J3-J4	J3-J4	RS-422

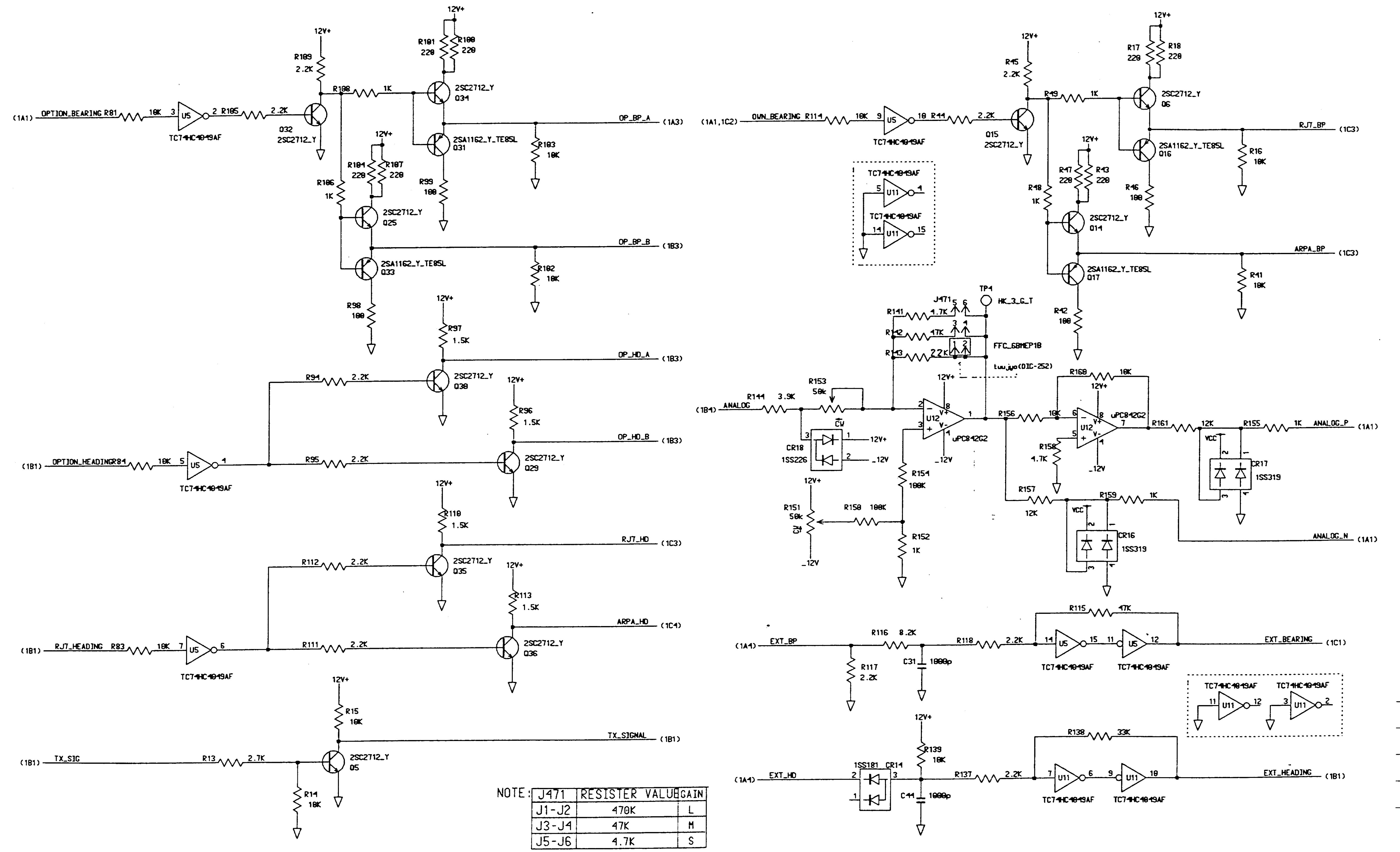
J470	
J1-J2	RS-422
J3-J4	CURRENT ROOP

<USED INS LINE>

DRAWN Apr. 21 '99 T. YAMASAKI		TYPE 03P9252
CHECKED Apr. 21 '99 K. Kusunoki	OTHERS FR-2125 FR-2115	名称 INT基板（2／4） 回路図
APPROVED Apr. 21 '99 K. Kusunoki		
SCALE / MASS kg	APPLICABLE TO: (MODEL) BLOCK NO.	NAME INT BOARD(2/4)
DWG NO. C3464-K09- B	03-144-6011- 5	SCHEMATIC DIAGRAM

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済

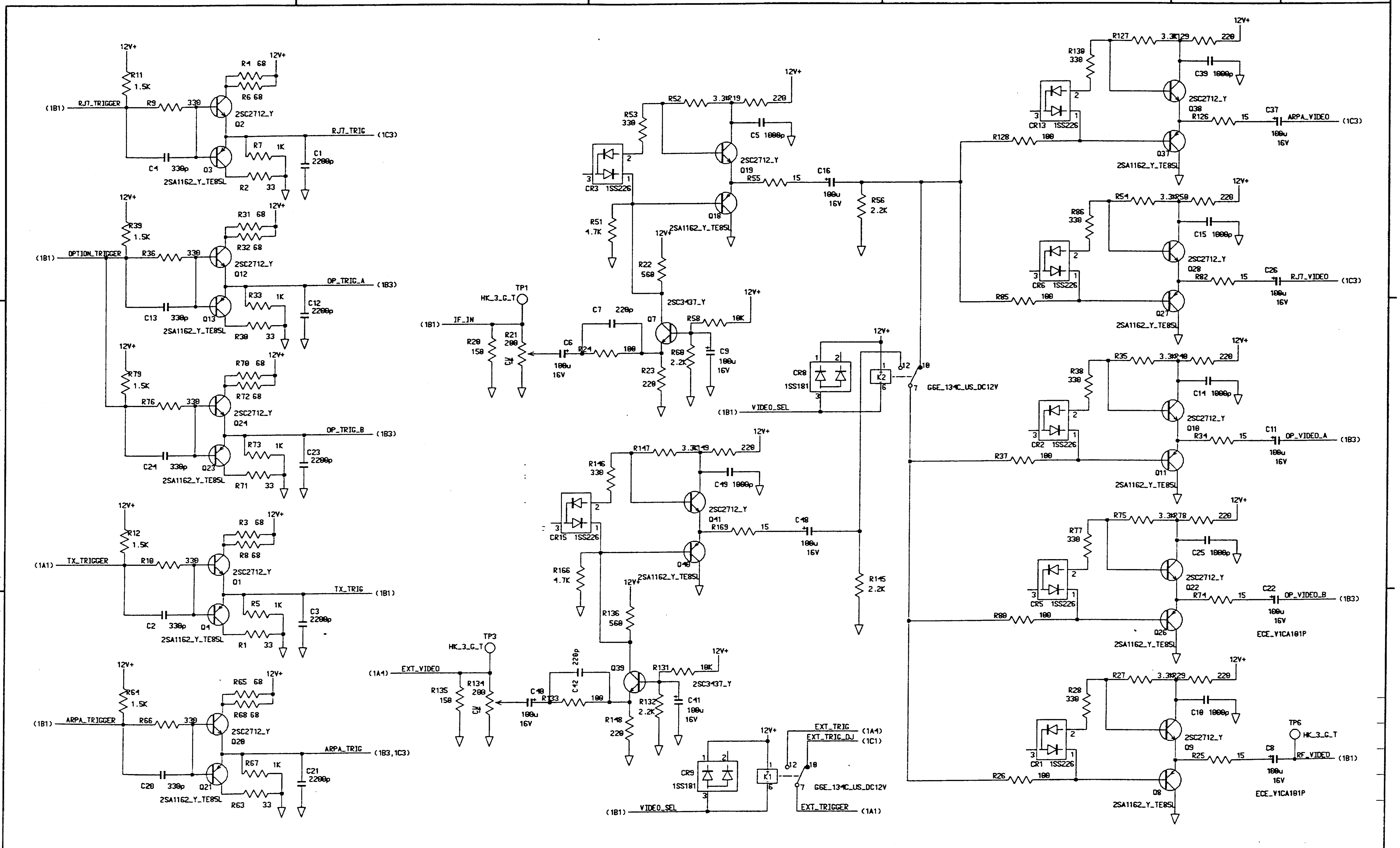


NOTE:

J471	RESISTER VALUE	GAIN
J1-J2	470K	L
J3-J4	47K	M
J5-J6	4.7K	S

DRAWN Apr.21 '99 T.YAMASAKI		TYPE	03P9252
CHECKED Apr.21 '99 K.Kusumoki	OTHERS	名称	INT基板（3／4）
APPROVED Apr.21 '99 K.Kusumoki	FR-2125 FR-2115		回路図
SCALE / MASS kg	APPLICABLE TO: (MODEL) BLOCK NO.	NAME	INT BOARD(3/4)
DWG NO. C3464-K10- B	03-144-6011- 5		SCHEMATIC DIAGRAM

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DRAWN Apr 4 '99 T.YAMASAKI			TYPE	03P9252
CHECKED Apr 21 '99 K.Kusunoki	OTHERS		名称	INT基板（4／4）
APPROVED Apr 21 '99 K.Kusunoki	FR-2125 FR-2115			回路図
SCALE /	MASS kg	APPLICABLE TO: (MODEL)	BLOCK NO.	NAME INT BOARD(4/4)
DWG NO. C3464-K11- B		03-144-6011- 5		SCHEMATIC DIAGRAM

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